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VISION CARE TASK FORCE

REPORT

October 31st., 1977

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VISION CARE TASK FORCE

1875 Ocean Park Road
Surrey, B.C.
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October 31, 1977

The Honourable R.H. McClelland
Minister of Health
Parliament Buildings
Victoria, B.C.

Sir:

Presented herewith is the report of the Task Force created by you in April 1976, to undertake the study of the present system of vision care provided to the people of British Columbia and to make recommendations to you for its modification and improvement, where such improvement could be foreseen.

The Task Force believes that the materials and recommendations contained in the report will be helpful to you in initiating a more efficient system of vision care for the benefit of all British Columbians.

The members of the Vision Care Task Force wish to state that participation in these deliberations has been a most informative experience and to express their appreciation to you for the opportunity to serve.

Yours truly,

J.E. Liersch, O.C.
Chairman, Vision Care Task Force

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SUMMARY OF RECOMMENDATIONS

Recommendation 1. THAT THE RESPECTIVE BODIES INVOLVED IN COOPERATION ON VISION CARE RECOMMENDATIONS MAKE APPROPRIATE CHANGES TO THEIR RESPECTIVE ACTS, REGULATIONS AND ETHICAL POSITIONS TO PERMIT DIRECT AND RECIPROCAL REFERRALS OF PATIENTS BETWEEN OPTOMETRISTS AND OPHTHALMOLOGISTS, AND BETWEEN OPTOMETRISTS AND GENERAL PRACTITIONERS.

Recommendation 2. THAT THE REGULATIONS GOVERNING PAYMENT OF OPHTHALMOLOGISTS UNDER THE MEDICAL SERVICES ACT BE AMENDED TO PERMIT PAYMENT OF A CONSULTANT FEE TO OPHTHALMOLOGISTS WHO ATTEND PATIENTS REFERRED BY AN OPTOMETRIST.

Recommendation 3. THAT THE CODE OF ETHICS IN THE REGULATIONS GOVERNING THE PRACTICE OF OPTOMETRY UNDER THE OPTOMETRY ACT SHALL BE CHANGED TO ENSURE:

> IT WOULD ALWAYS BE THE DUTY OF EVERY OPTOMETRIST TO REFER TO THE APPROPRIATE MEDICAL PROFESSIONAL THOSE PATIENTS IN WHOM HE SUSPECTS OR DETECTS ANY CONDITION THAT IS OF A NATURE THAT DEMANDS SUCH REFERRAL. THIS DUTY WILL EXTEND TO ALL
>
> - INTERNAL AND EXTERNAL OCULAR ABNORMALITIES;
> - DEVIATIONS IN VISUAL ACUITY NOT PREVIOUSLY EXPLAINED;
> - HISTORY OF FAMILIAL OCULAR AND SYSTEMIC CONDITIONS NOT PREVIOUSLY IDENTIFIED BY A

PHYSICIAN.

Recommendation 4. THAT A COLLEGE OF OPTOMETRISTS BE ESTABLISHED TO REPLACE THE PRESENT BOARD OF EXAMINERS IN OPTOMETRY IN BRITISH COLUMBIA. THE COLLEGE WOULD BE COMPOSED OF ALL MEMBERS LICENSED TO PRACTISE UNDER THE OPTOMETRY ACT OF THE PROVINCE AND WITH A COUNCIL MADE UP OF SEVEN (7) MEMBERS; FIVE MEMBERS OF THE COLLEGE OF OPTOMETRISTS ELECTED BY THE MEMBERSHIP AND TWO PERSONS APPOINTED BY THE LIEUTENANT GOVERNOR. THE COUNCIL WILL ESTABLISH AND REGULATE STANDARDS OF KNOWLEDGE AND COMPETENCY, STANDARDS OF QUALIFICATIONS TO PRACTISE, STANDARDS OF PROFESSIONAL CONDUCT AND WILL ADMINISTER THE ACT.

Recommendation 5. THE MINISTER OF HEALTH, IN CONJUNCTION WITH THE DISPENSING OPTICIANS ASSOCIATION OF BRITISH COLUMBIA, AND AFTER APPROPRIATE REVIEW BY THE COLLEGE OF PHYSICIANS AND SURGEONS OF BRITISH COLUMBIA, THE BRITISH COLUMBIA MEDICAL ASSOCIATION, AND THE BRITISH COLUMBIA OPTOMETRIC ASSOCIATION, PREPARE AND SUBMIT TO THE LEGISLATIVE ASSEMBLY OF THE PROVINCE AN ACT RESPECTING DISPENSING OPTICIANS. THIS ACT IS URGENTLY REQUIRED AND SHOULD ENSURE:

a. RESTRICTION OF THE DISPENSING OF GLASSES OR THE FITTING OF CONTACT LENSES TO THOSE PERSONS WHO ARE PROPERLY TRAINED;

b. THE ESTABLISHMENT OF A TRAINING PROGRAM FOR DISPENSING OPTICIANS, AND A MECHANISM TO APPROVE THAT PROGRAM.

c. LICENSING OF DISPENSING OPTICIANS IS GRANTED AFTER ASSURANCE BY AN EXAMINING BOARD THAT THEY ARE PROPERLY QUALIFIED TO PRACTICE;

d. ALL DISPENSING OPTICIANS CURRENTLY PRACTICING IN THIS PROVINCE SHALL, WITHIN TWO YEARS, POSSESS THE QUALIFICATIONS SET BY THE BOARD IN ORDER TO OBTAIN A LICENCE;

e. SPECIAL QUALIFICATIONS BE REQUIRED FOR THOSE FITTING CONTACT LENSES, NAMELY:

i. CONTACT LENS DISPENSERS MUST BE SPECIALLY CERTIFIED;

ii. INITIALLY THE EXAMINING BOARD SHALL CONTAIN AT LEAST ONE OPHTHALMOLOGIST, AND AT SOME TIME IN THE FUTURE IT MAY BE DESIRABLE TO INCLUDE AN OPTOMETRIST;

iii. CERTIFIED CONTACT LENS DISPENSERS MUST HAVE:

-- COMPLETED A RECOGNIZED CONTACT LENS FITTING COURSE,

-- PASSED AN EXAMINATION EITHER SET OR APPROVED BY THE EXAMINING BOARD,

-- SPENT ONE YEAR OF SUPERVISED TRAINING UNDER A CERTIFIED CONTACT LENS DISPENSER,

-- HAVE DEMONSTRATED ADEQUATE TRAINING WITH RESPECT TO REQUIRED INSTRUMENTATION AS DETERMINED BY THE EXAMINING BOARD;

iv. THE CERTIFIED CONTACT LENS DISPENSER MUST BE A HOLDER OF A VALID DISPENSER'S LICENCE (I.E., MUST FIRST BE A QUALIFIED DISPENSER),

f. A CONTACT LENS DISPENSER MUST BE PERMITTED TO USE ANY DEVICE NECESSARY IN MEASURING AND EVALUATING THE FIT OF CONTACT LENSES, PROVIDING THESE DEVICES ARE USED FOR THESE PURPOSES ONLY.

g. CONTACT LENSES SHALL BE DISPENSED BY A LICENSED CONTACT LENS DISPENSER ONLY PURSUANT TO A WRITTEN SIGNED ORDER BY, AND ONLY UNDER THE SUPERVISION OF A DULY QUALIFIED OPHTHALMOLOGIST OR OPTOMETRIST.

SUPERVISION MEANS THAT THE OPTOMETRIST OR THE OPHTHALMOLOGIST SHALL INITIATE THE PRESCRIPTION, ASSESS THE ADEQUACY OF THE FIT AND ASSUME THE FINAL RESPONSIBILITY FOR THE EVALUATION OF THE CONTACT LENS PATIENT.

h. UNLESS OTHERWISE SPECIFIED, A WRITTEN CONTACT LENS PRESCRIPTION BY AN OPHTHALMOLOGIST OR OPTOMETRIST AUTHORIZES THE CONTACT LENS DISPENSER TO MEASURE THE CORNEAL RADIUS AND TO ADJUST THE SPHERICAL LENS POWER WITH TRIAL LENSES ONLY BY NOT MORE THAN ONE DIOPTER.

i. THE CONTACT LENS DISPENSER SHALL NOT REFRACT, OVER-REFRACT OR

MAKE EVALUATIONS WITH REGARD TO THE HEALTH AND FUNCTION OF THE LIVING EYE, OTHER THAN THAT PERMITTED IN RECOMMENDATION 5(h) OR NECESSARY MODIFICATIONS FOR EFFECTIVE POWER.

j. THE RECOMMENDED ETHICAL PROCEDURES FOR THE FITTING OF CONTACT LENSES INVOLVE THE FOLLOWING.

-- A PRESCRIPTION. THE PRESCRIPTION MUST CONTAIN APPROVAL FOR CONTACT LENSES;

-- THE PRESCRIBER'S PATIENT MUST BE REFERRED BACK FOR FINAL EVALUATION AND APPROVAL. KERATOMETER READINGS, LENS TYPES, SOLUTIONS BEING USED, AND ANY OTHER INFORMATION THE PRESCRIBER MAY REQUEST, SHALL BE FORWARDED.

-- AFTER FINAL EVALUATION AND APPROVAL, ANY FURTHER MODIFICATIONS MUST REQUIRE THE PERMISSION OF THE PRESCRIBER.

Recommendation 6. APPROPRIATE CHANGES BE MADE IN THE *OPTOMETRY ACT* WITH ITS REGULATIONS, AND REFERENCE BE MADE IN THE PROPOSED *DISPENSING OPTICIANS ACT* OR IN ITS REGULATIONS TO COVER THE USE OF ANY DEVICES NECESSARY TO FIT CONTACT LENSES, BUT PROHIBITING THE USE OF THESE DEVICES FOR ANY OTHER PURPOSE.

Recommendation 7. APPROPRIATE CHANGES BE MADE IN THE *OPTOMETRY ACT* OR IN THE REGULATIONS TO THE *OPTOMETRY ACT* THAT WILL FREE THE FLOW OF OPTOMETRIC CONTACT LENS PRESCRIPTIONS TO DISPENSING OPTICIANS, PROVIDING THAT AN ADEQUATE *DISPENSING OPTICIANS ACT* HAS BEEN ESTABLISHED AND A TRAINING PROGRAM DEVELOPED THAT ENSURES COMPETENCY AND RESPONSIBILITY IN CONTACT LENS FITTING.

Recommendation 8: THAT A VISION CARE PROGRAMME, INCORPORATING A VARIETY OF MODELS BE ESTABLISHED BY THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA, TAKING INTO ACCOUNT THE FOLLOWING PRINCIPLES:

a. THE PARTICULAR MODEL SHOULD VARY WITH THE COMMUNITY OR REGIONAL VISION CARE MANPOWER REQUIREMENTS.

b. IN GENERAL, THE EMPHASIS SHOULD BE PLACED UPON PROVIDING CARE BY MEANS OF VISITING VISION CARE PERSONNEL AT A CENTRAL LOCATION IN RURAL AREAS. PRIORITIES SHOULD BE GIVEN TO AREAS WITH NO REGULAR EYE CARE AND WHICH ARE LOCATED A MINIMUM OF FORTY MILES FROM CENTRES WITH EYE CARE. THE CHOICE OF LOCATION IS AFFECTED BY THE SURROUNDING CATCHMENT AREA.

c. VISION CARE SERVICES SHOULD BE PLANNED AND ORGANIZED BY THE GOVERNMENT WITH THE COOPERATION OF THE FOUR GROUPS--PHYSICIANS AND/OR OPHTHALMOLOGISTS, OPTOMETRISTS, DISPENSING OPTICIANS, OTHER RELATED HEALTH PERSONNEL, AND SHOULD BE COORDINATED:

i. TO VISIT COMMUNITIES REGULARLY AND USUALLY FOR AT LEAST A THREE-DAY PERIOD;

ii. TO INCORPORATE THOSE PHYSICIANS OR OPTOMETRISTS WHO HAVE ALREADY ESTABLISHED SATELLITE PRACTICES.

iii. WITH THE SCREENING ACTIVITIES AND PROFESSIONAL SERVICES IN THE COMMUNITY. FOR EXAMPLE, VISITS MIGHT BE RELATED WITH THE SCHOOL TESTING PROGRAMME.

d. PAYMENT FORMULAE OF PROFESSIONALS AND OTHER PERSONNEL SHOULD TAKE INTO ACCOUNT THE EXISTING AVERAGE OVERHEADS IN

PRACTITIONERS OWN OFFICES. POSSIBLE FORMULAE INCLUDE PAYMENT OF A SESSIONAL FEE, SALARY, OR CONTRACTUAL ARRANGEMENTS FOR THE ENTIRE WORKING AND TRAVEL TIME USED.

e. THE COMMUNITIES SHOULD BE RESPONSIBLE FOR HOUSING AND STORING OF EQUIPMENT AND THE NECESSARY PUBLICITY AND ADVANCE APPOINTMENT SYSTEM. MUCH OF THIS SHOULD BE DONE THROUGH COMMUNITY PUBLIC HEALTH UNITS. OTHER SERVICE ORGANIZATIONS SUCH AS THE LIONS CLUB, AND THE CNIB MIGHT ALSO BECOME INVOLVED.

Recommendation 9: THAT EXISTING FACILITIES, STENOGRAPHIC AND SUPPORT SERVICES USED BY HOSPITALS, OPTOMETRISTS, PHYSICIANS OR CLINICS BE USED WHERE EVER POSSIBLE BY TRAVELLING CLINICS, AND ADEQUATE COMPENSATION FOR THEIR USE BE PROVIDED BY THE GOVERNMENT.

Recommendation 10: THAT A BASIC CHART BE CREATED UPON WHICH PATIENT INFORMATION CAN BE RECORDED AND KEPT IN AN OFFICIAL COMMUNITY FACILITY SUCH AS THE COMMUNITY HOSPITAL OR HEALTH UNIT.

Recommendation 11: THAT THE PLANNING AND COORDINATION OF THE VISION CARE PROGRAMME BE ASSIGNED TO COMMUNITY HEALTH PROGRAMMES OF THE MINISTRY OF HEALTH.

Recommendation 12. THAT THE GOVERNMENT OF BRITISH COLUMBIA REMAIN IN CONSULTATION WITH THE MINISTERS OF HEALTH AND EDUCATION IN THE OTHER WESTERN PROVINCES AND CONSIDER ANY

PROPOSAL FOR COOPERATION IN OPTOMETRIC EDUCATION. THIS IS IN VIEW OF THE OPINION OF THE TASK FORCE THAT THE NEED FOR A SEPERATE SCHOOL OF OPTOMETRY FOR BRITISH COLUMBIA ALONE CANNOT BE SUBSTANTIATED.

Recommendation 13. THAT THOSE WHO PRESCRIBE OPTICAL DEVICES SHOULD NOT PROFIT FROM THE SALE OF OPTICAL DEVICES.

INTRODUCTION

The establishment of the Vision Care Task Force was announced by the Honourable R.H. McLelland, Minister of Health of the Province of British Columbia, on April 1, 1976. Its purpose was to examine the present vision care system in British Columbia, to approximate its cost, and to recommend any changes in the system which, in the opinion of the Task Force, would provide better, more efficient care at the lowest cost. All of this to be done with the main objective of protecting the health of the people of B.C. in this particular field. (See Appendix I - Membership of, and Terms of Reference for, the Vision Care Task Force).

Due to unavoidable delays, the first meeting of the Task Force was held on September 15th, 1976. This was primarily an exploratory meeting only. Since then the Task Force has held 16 meetings over the past year, in addition to compiling and collating numerous tables (50) and figures (14) having to do with present and future manpower supply in ophthalmology and optometry, workload of these professionals, percent of population requiring the services of such professionals, etc. It has also received six briefs from different organizations whose members are responsible for vision care in B.C. in addition to receiving reports from a steering committee consisting of three members of the Task Force set up to solve specific problems encountered by the Task Force in the course of its deliberations.

It has considered the length and type of training received by the professionals, para-medicals, opticians and other workers in the vision care field with the object of determining the adequacy of these programmes. It has debated at length the cost and the necessity or otherwise of establishing and operating a School of Optometry in British Columbia or one of the other Western Provinces, in order to meet any possible deficiency in professional manpower in the future up to the year 1991. It has considered correspondence and information received from professional organizations in the United States and Great Britain. All of the above has led the Task Force to reach certain conclusions and make certain recommendations to you, Mr. Minister in the hope that, if implemented over the next few years, better and more efficient eye care may be provided for the people of British Columbia.

Before concluding these introductory paragraphs, however, the Task Force wishes to comment on the work and dedication of Dr. D.O. Anderson, Secretary to the Task Force from its inception to June 30, 1977. Without the invaluable help, advice, organization and instruction of Dr. Anderson over this period the Task Force would not have been able to accomplish anything like the consensus that has so far been reached.

Dr. Brian Schmidt, an optometrist and M.Sc. student in Health Services Planning, has agreed, at the request of the Minister, to act as Recording Secretary for the Task Force from June 30th to its conclusion.

THE CURRENT SYSTEM AND COSTS OF VISION CARE

1. Definition of Vision Care

In this report vision care is defined as

> the prevention, diagnosis and management of functional problems of the human visual system, along with the identification and referral for appropriate ophthalmologic care of persons with ocular pathological problems.

2. Description of the Current System

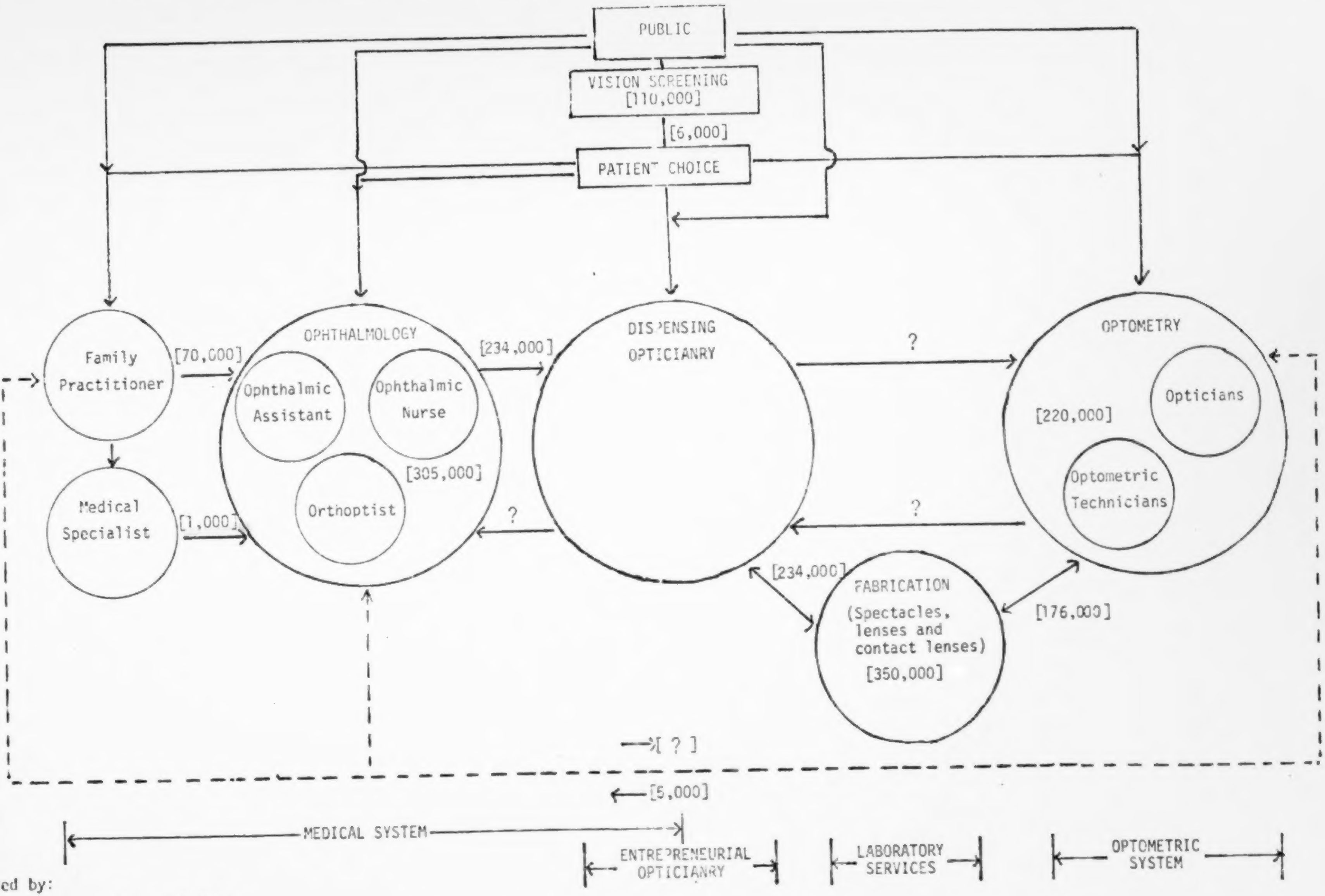
There exist three partially overlapping systems of vision care in British Columbia: screening, the medical system and the optometric system. The medical system makes use of dispensing opticianry in part, but the latter discipline also serves the public directly. Both opticianry and optometry make use of the spectacle and lens fabrication laboratories.

These systems and their interrelationships are shown in Fig. 1, with the best estimates of annual incidence figures where these can be developed.

a. Vision Screening

Community Health Programs in the Ministry of Health operate a formal vision screening system. Between five to six percent of children screened at school (or kindergarten) are referred. The parents of the referred child decide whether or not to follow through on the referral, and if so, whether to seek an

FIGURE 1: The Vision Care Systems, British Columbia, 1976


PUBLIC
VISION SCREENING [110,000]
[6,000]
PATIENT CHOICE
Family Practitioner
[70,000]
Medical Specialist
[1,000]
OPHTHALMOLOGY
Ophthalmic Assistant
Ophthalmic Nurse
Orthoptist
[305,000]
[234,000]
?
DISPENSING OPTICIANRY
?
?
OPTOMETRY
Opticians
[220,000]
Optometric Technicians
[234,000]
FABRICATION (Spectacles, lenses and contact lenses) [350,000]
[176,000]
[?]
[5,000]
MEDICAL SYSTEM
ENTREPRENEURIAL OPTICIANRY
LABORATORY SERVICES
OPTOMETRIC SYSTEM

Prepared by:

Health Manpower Research Unit
University of British Columbia

examination by an optometrist or physician.

Other vision screening exists: automobile drivers examinations and geriatric clinics are examples. In the main it is assumed that those screened under these latter methods are already under vision care. Screening attempts to identify both functional vision care needs and pathology for medical treatment.

b. The Medical System

The Medical Vision-Care system draws together the family practitioner, the medical specialist and the ophthalmologist (who may employ an ophthalmic assistant or British trained optometrist, an ophthalmic nurse or an orthoptist). Where refractive problems occur, the system consists of a written prescription from the ophthalmologist to the dispensing optician for the fabrication of corrective lenses and the evaluation of these lenses when fabricated. The system further determines the presence or otherwise of pathological vision problems and, if such conditions are found, diagnoses and treats them.

c. The Optometric System

This system is largely self contained, including the prescription, dispensing and evaluation of fabricated lenses; though some optometrists will employ opticians. Where pathological problems are suspected, referrals are made to physicians. Optometrists are prevented from issuing prescriptions or optometric findings to dispensing opticians to fit contact lenses under Section 34 of the Regulations to the Optometry Act.

d. The Opticianry System

The relationship between dispensing opticians and ophthalmologists is governed by a prescription and the patient's free choice of dispenser. In addition to dispensing spectacles, dispensing opticians also fit contact lenses. The public also has direct access to dispensing opticians through retail outlets.

e. Laboratory Services

Almost all dispensing opticians and optometrists purchase their specified lenses and spectacle frames from commercial fabricating companies.

This loosely knit system permits free public choice of point-of-entry, the underlying model of care (i.e., "Medical" or "Optometric"), and of dispenser of the required corrective devices. The total public cost of the system, however, is considerable.

3. Estimate of the Cost to the Public of the Vision Care System

It is impossible to make any accurate estimate of the cost to the public of the present vision care system. The Task Force has attempted ,however, to estimate this cost, based on some gross assumptions and the numbers of people making use of the vision care system, as shown in Figure 1. The assumptions are:-

a. That 4/5ths of refractive examinations performed result in a prescription for spectacles. Although a proportion of consultations result in a prescription for spectacles, it is not certain to what degree this is so. Consultations, therefore, are not considered in the calculations but some compensation results from the fact that the 4/5ths figure may be high.

b. That 10% of those purchasing spectacles will also purchase contact lenses.

c. That 50% of those purchasing contact lenses will do so through the medical system and 50% of the purchases will be made through the optometric system.

d. That 5000[1] people will purchase contact lenses directly from dispensing opticians without consulting either an ophthalmologist or an optometrist.

e. That the average cost of lenses and frames for spectacles (paid to a dispensing optician or an optometrist) will be $60.00.[2]

---

[1] This may quite likely be a high estimate of numbers.

[2] This estimate is somewhat conservative and varies between systems.

f. That the cost of contact lens purchase and fitting under the optometric system is $200.00.

g. That the cost of contact lenses under the medical system is $61.00 for professional services and $175.00 for opticianry services.

h. That the cost to people "off the street" buying contact lenses without any prescription is $175.00.

Based on the above assumptions the total cost of vision care in 1976 is estimated to be $42,577,000.00, or about $17.70 for every man , woman and child in the Province. It can also be said that:-

a. Approximately 20% of the expenditure is for contact lenses.

b. The total cost per patient receiving eyewear, including both spectacles and contact lenses, is $87.30 in the medical system and $84.50 in the optometric system (See Appendix II for details of calculations).

c. The total cost to M.S.C. is about $12,000,000 dollars.

d. The total cost of spectacles and contact lenses to individuals requiring or ordering same is about $31,500,000 dollars.

THE ROLE, TRAINING, SUPPLY, AND WORKLOAD OF VISION CARE PERSONNEL

There are three main categories of vision care workers who are responsible for the treatment of the great bulk of the vision care needs of the people of B.C. These are; the ophthalmologists, the optometrists, and the dispensing opticians.

In the medical disciplines the Family Physician and the other medical specialists play relatively minor roles.

The para-medical categories work primarily under medical supervision in a supportive role. These are; The Public Health Nurse, the Ophthalmic Assistant, the Orthoptist, the Ophthalmic Nurse, and the Ocularist.

The dispensing optician, while playing a major role in the provision and fitting of spectacles and contact lenses, does so usually through a prescription received from a medical practitioner for such corrective devices.

The roles, training, supply and workload of the main groups providing vision care are described below.

1. THE FAMILY PHYSICIAN

The Family Physician is a graduate in medicine from a recognized medical school and has the degree of Doctor of Medicine (BCMA, 1977), or Bachelor of Medicine (U.K.).

The Family Physician should be able to treat adequately the common eye complaints and injuries found within the sphere of primary care (BCMA, 1977), and refer functional and pathological conditions, where appropriate, to the appropriate vision care practitioner.

2. THE MEDICAL SPECIALIST

The Medical Specialist is a graduate in medicine from a recognized medical school who has special training in certain aspects of medical disease, (BCMA, 1977) and has been certified in a specialty by the Royal College of Physicians and Surgeons of Canada.

The Medical Specialist is available for general systemic problems related to ophthalmic disease (BCMA, 1977). Referral here is a two way affair with diagnosis and treatment directed to the appropriate specialty (BCMA, 1977).

3. THE OPHTHALMOLOGIST

a. Definition and Role

The Ophthalmologist is a Doctor of Medicine and a graduate from a recognized medical school. This physician has been certified in Ophthalmology by the Royal College of Physicians and Surgeons of Canada (BCMA, 1977).

The Ophthalmologist acts in the diagnosis and treatment of ocular diseases, in the application of physiological and optical principles to the prescription of glasses and the correction of aberrations of ocular function, and in surgery of the eye and its related structures (COS, 1975).

The Ophthalmologist should be capable of handling all types of minor and severe ocular injuries, eye diseases, and visual functions (BCMA, 1977).

b. Training of Ophthalmologists

Within the Faculties of Medicine at many Canadian and American universities, a four year programme is offered after a minimum of two to three pre-professional years, which leads to the degree of Doctor of Medicine. There is considerable flexibility in the course content between different medical schools, but some core instruction is given in ophthalmology.

Post-graduate courses are offered to physicians in the specialty of Ophthalmology which satisfy the specialty training requirements of the Royal College of Physicians and Surgeons of Canada. The programme is of four years duration, and follows a single pre-registration year of interneship (or a straight residency) at an approved hospital. Under the Medical Act, the College of Physicians and Surgeons of British Columbia recognizes the responsibility of the Royal College of Physicians and Surgeons for the training programmes and examination of specialists; the Royal College, in turn, accredits training programmes established by Faculties of Medicine, and assigns much of the responsibility for evaluation to the individual programme director in a specialty field at each medical school. (See Appendix IV - Details of Ophthalmology Courses at the U.B.C. Faculty of Medicine)

The accreditation of medical programmes in Canada is complex. Undergraduate medical programmes are accredited by the Association of Canadian Medical Colleges Liason Committee on Medical Education, which is authorized to do so by the College of Physicians and Surgeons of B.C. under the Medical Act. Internship (pre-registration) programmes are accredited by the National Joint Committee on Approval of Pre-registration Physician Training Programmes, with representation from organizations such as the Association of Canadian Medical Colleges, the Canadian Association of Interns and Residents, and the Canadian Medical Association. Finally, hospitals used to train medical students must be accredited by the Canadian Council on Hospital Accreditation of the Canadian Hospital Association.

Canadian post-graduate training programmes, including those for ophthalmology, must be accredited by the Standing Committee on Accreditation of Programmes of the Royal College of Physicians and Surgeons of Canada.

Canadian medical authorities do not accredit foreign schools or programmes, but ensure by examination that their graduates are qualified before they are allowed to practice.

Both optometry and medicine are entrusted by the government and the community at large with setting standards of quality for their own members. In general, the professions have been accorded this delegated power because the community has two basic beliefs. First, it believes in the peer system whereby professionals utilize objectivity and their knowledge in making judgments concerning their profession. Second, it believes that professionals, by their very nature, will act on behalf of the community (Whitman, 1974).

Section 34 of the Medical Act requires that all persons wishing to practice medicine in British Columbia pass an examination approved by the Board of Examiners of that province; in fact, the Medical Council of Canada and the Royal College of Physicians and Surgeons of Canada is authorized to act on behalf of that Board.

C. Legislation and Regulations governing Ophthalmology

In the Province of British Columbia, ophthalmologists, as physicians, are regulated by the Medical Act and its Regulations. The Act provides for the registration, examination, certification, and discipline of duly qualified physicians.

The British Columbia Medical Association is the official professional association for physicians in British Columbia and has voluntary membership. The College of Physicians and Surgeons of British Columbia is the official governing and examining body for all Provincial physicians. Medical specialists, including

Ophthalmologists, must attain certification by the Royal College of Physicians and Surgeons of Canada to be recognized as specialists in British Columbia. This requirement for Royal College certification is not universal across Canada.

The _Medical Act_ allows the Council of the College of Physicians and Surgeons to make regulations respecting its members. These regulations outline the discipline and registration procedures for persons to be registered under the _Medical Act_. The Code of Ethics of the Canadian Medical Association does not form part of the Act or its regulations. The Canadian Ophthalmological Society has its own Code of Ethics which describes the ethical behaviour of most ophthalmologists in British Columbia, though the COS also subscribes to the code of the Canadian Medical Association. It is not required that an ophthalmologist be a member of the COS to practice his specialty in British Columbia.

The _Medical Act_, through its regulations (Sections 84-90), recognizes the medical specialist and allows a registrant to practice a specialty by virtue of his registration and good standing with the Royal College of Physicians and Surgeons of Canada.

The Task Force identified certain sections within the _Medical Act_ and the _Medical Services Act_ which affect the development of a coordinated vision care system for British Columbia.

Under Section 85 of the _Medical Act_ members of the College of Physicians and Surgeons are forbidden to enter into certain relationships with non physicians. The wording of the section follows:

> 85.(1) In case a member of the College practises medicine in partnership with, or under a contract with, or as a business associate of, any person not entitled to practise medicine, surgery, or midwifery, or does any act to enable any such person to practise medicine, surgery, or midwifery, both parties to such partnership, contract, or arrangement are liable, on summary conviction, to a penalty not exceeding two hundred and fifty dollars and not less than one hundred dollars, and any member of the College convicted under this section shall have his name erased from the register by the Council.
>
> (2) No charge shall be brought under this section without the written approval of the Council, evidenced by a certificate given under the hand of the registrar and the seal of the College. R.S. 1948, c.206, s.85; 1966, c.26, s.51

The College of Physicians and Surgeons has, in the past, construed this section to mean that it is unethical and hence unacceptable for an ophthalmologist to directly receive or directly make referrals with optometrists. However a recent interpretation of this section of the Act both by counsel to the College of Physicians and Surgeons and government counsel, states clearly that this section should not be interpreted to mean that referrals between an optometrist and a physician, or vice versa, are in any way unethical. Before a notable demonstration was initiated in the Queen Charlotte Islands by the Ministry of Health in conjunction with the Ophthalmologists, Optometrists and Dispensing Opticians, a specific waiver of action under this section was requested and obtained from the

Council of the College of Physicians and Surgeons.

Section 5.12 from the Regulations of the Medical Services Act prohibits the payment of a consultant's fee to ophthalmologists who attend patients who have not been referred by a general practitioner. The specific section reads:

> 5.12 Services rendered for an insured person by a specialist without a referral by a general practitioner to the specialist shall, under the Plan, be paid in an amount equal to the fee that would have been paid had the services been rendered by a general practitioner, and the Commission shall not be responsible for the difference between the specialist fee and that of a general practitioner, except where the specialist fee is the only applicable fee.

This regulation, therefore, would not permit payment of consultant's fees for patients referred to an ophthalmologist by an optometrist. The success of any amendments to the Medical Act regarding referrals is clearly dependent upon further amendments to this section of the Medical Services Act

The Vision Care Task Force has reviewed the situation in other provinces of Canada. Only in the Province of Saskatchewan does the Medical Insurance Plan specifically recognize referral by an optometrist to an ophthalmologist as proper referral for payment of the ophthalmologist at specialist rates. The Medical Acts of the Provinces of Ontario, Manitoba, Alberta, Saskatchewan and Quebec do not specifically prohibit referrals between optometrists and ophthalmologists.

Section 87 of the Medical Act lays down strict criteria regarding who may, or may not, utilize the title "doctor". The specific section reads as follows:

> 87. (1) No person not registered under this Act shall use, assume, or employ, or advertise, or hold himself out under the title of "doctor," "surgeon," or "physician," or any affix or prefix or abbreviation of such titles as an occupational designation relating to the treatment of human ailments.
>
> (2) Subsection (1) does not apply to any person registered under the Dentistry Act, or to any person having a diploma in medicine or surgery from any college or school of medicine and surgery requiring at least four years' course of study, and who is not treating or attempting to treat human ailments for gain in the Province of British Columbia. R.S. 1948, c.206,s.87

Under the existing Medical Act, with its regulations, and under the Canadian Medical Association Code of Ethics, ophthalmologists may lecture at a School of Optometry, or take part in post graduate training programmes for Optometrists. The Canadian Ophthalmological Society contains a specific regulation, (COS, 1968), which prevents this activity, viz.

> a. The Canadian Ophthalmological Society recognizes and subscribes to the Code of Ethics of the Canadian Medical Association.
>
> b. Members of the Society may formally teach or instruct, directly or indirectly, only medical

and paramedical personnel[1]

The position of the COS has changed considerably, and on June 8th, 1977, the above statement was repealed and replaced by the following, described as "Regulation 1", pursuant to COS By-Law #1:

> COS members are expected to honour the following principles:
>
> (a) The medical profession in general and ophthalmologists in particular have a responsibility to provide leadership in developing plans for effective, efficient and realistic eye care for Canadians in all communities as outlined in the C.M.A. Statement on Eye Care (1975).
>
> (b) Good eye care implies appropriate education of individuals and groups in the community.
>
> (c) Ophthalmologists in general and Members of the Society in particular have provided and will continue to provide appropriate instruction and teaching of good eye care to individuals or groups (medical, para-medical and non-medical) when such instruction or teaching is clearly in the best interest of and protects the members of the community, the public.
>
> (d) Current eye care legislation allows different individuals and groups to examine and advise members of the public, independently, but such eye care legislation does not always define responsibility or establish clear guidelines to legal limits of practice or work or liability.

---

[1] The statement of ethics places a footnote at this point, which reads: "Paramedical personnel being defined as those who have been trained by duly qualified physicians or under their supervision and direction, who work under the supervision and responsibility of physicians and who do not have legal rights (by legislative acts) to have patients of their own."

(e) The Members of this Society may instruct any groups that accept limitations and control which in the opinion of the COS quarantees the welfare of the public.

This modification of the COS position is noteworthy, and indicates a willingness to permit the broader involvement of ophthalmologists in the education of all vision care workers.

d. The Demographic Characteristics of Ophthalmologists in British Columbia

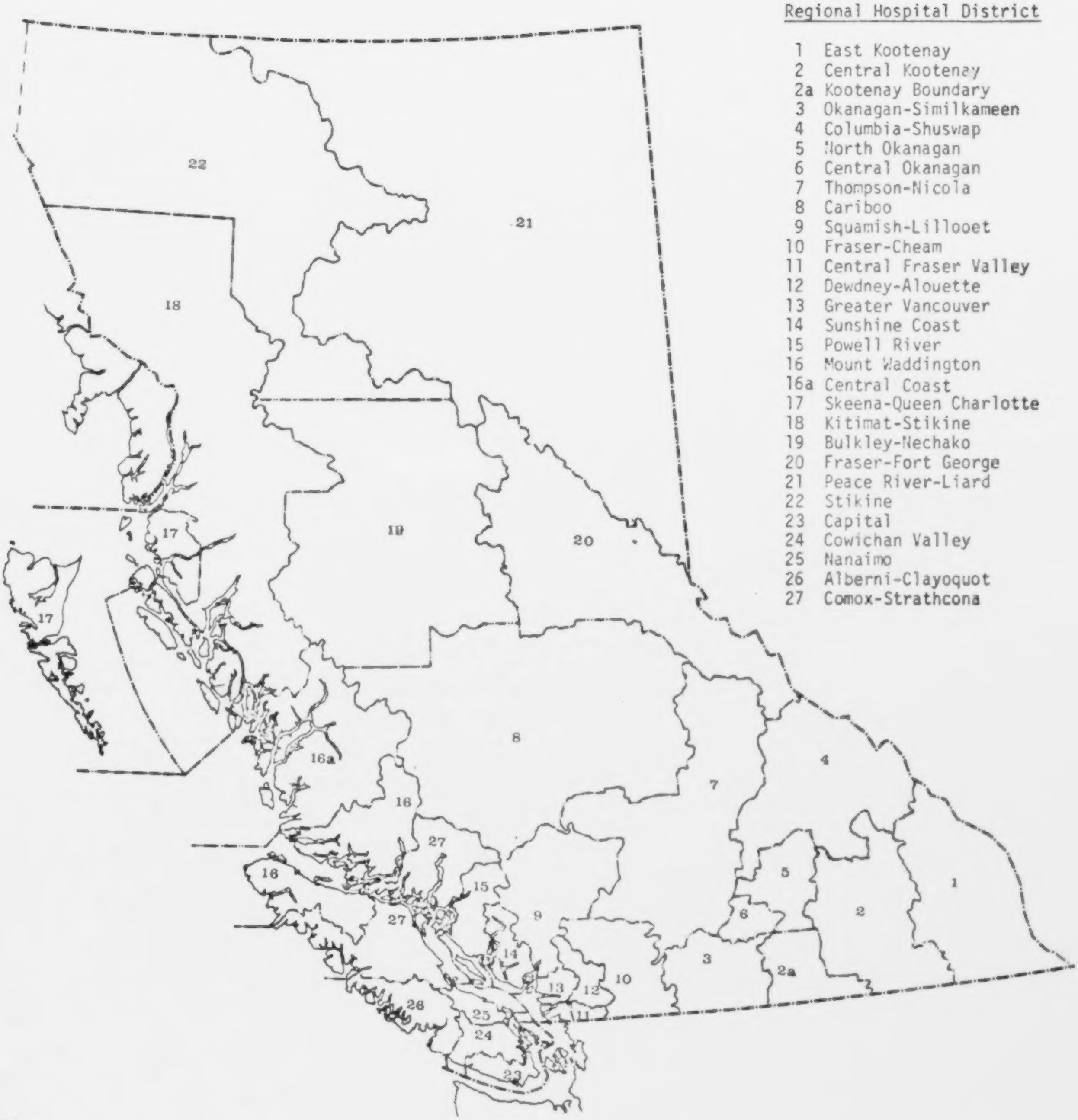
The following tables outline the demographic characteristics of ophthalmologists practicing in British Columbia.

Table 1 shows the number of MSC Active Ophthalmologists in B.C., by Regional Hospital District. The map of the Province showing Regional Hospital District boundaries is presented in Fig. 2. Table 1 also shows the FTE estimates (see Appendix III) by Regional Hospital District. The data indicate that there is a large variation between regions in manpower supply. There is less variation in supply than existed for the Optometrists at the same time (see Table 20, page 61), though there are more areas that are totally without ophthalmologic services than is the case for optometric services.

In Table 2, adjustments have been made to account for satellite practices, using data specifically collected for the Vision Care Task Force by the Section of Ophthalmology of the B.C. Medical Association. The inclusion of these satellite and

Figure 2

REGIONAL HOSPITAL DISTRICTS
OF
BRITISH COLUMBIA



Regional Hospital District

1	East Kootenay
2	Central Kootenay
2a	Kootenay Boundary
3	Okanagan-Similkameen
4	Columbia-Shuswap
5	North Okanagan
6	Central Okanagan
7	Thompson-Nicola
8	Cariboo
9	Squamish-Lillooet
10	Fraser-Cheam
11	Central Fraser Valley
12	Dewdney-Alouette
13	Greater Vancouver
14	Sunshine Coast
15	Powell River
16	Mount Waddington
16a	Central Coast
17	Skeena-Queen Charlotte
18	Kitimat-Stikine
19	Bulkley-Nechako
20	Fraser-Fort George
21	Peace River-Liard
22	Stikine
23	Capital
24	Cowichan Valley
25	Nanaimo
26	Alberni-Clayoquot
27	Comox-Strathcona

Prepared by:

Health Manpower Research Unit
University of British Columbia

Table 1: Number of MSC Active Ophthalmologists[1] and FTE[2] Ophthalmologists
by Regional Hospital District in British Columbia
for the year May 1975 to April 1976.

Regional Hospital District	Number	Number per Population[3]	Number of FTE[2]	FTE[2] per Population[3]	Ratio FTE /Number
1 East Kootenay	1.	21.85	1.02	22.28	1.02
2 Central Kootenay	1.	20.87	0.87	18.16	0.87
2a Kootenay Boundary	1.	31.95	0.99	31.63	0.99
3 Okanagan-Similkameen	2.	39.47	2.34	46.18	1.17
4 Columbia-Shuswap	0.	0.0	0.0	0.0	0.0
5 North Okanagan	3.	65.51	3.04	66.38	1.01
6 Central Okanagan	5.	72.34	3.59	51.79	0.72
7 Thompson-Nicola	4.	44.30	3.17	35.11	0.79
8 Cariboo	0.	0.0	0.0	0.0	0.0
9 Squamish-Lillooet	0.	0.0	0.0	0.0	0.0
10 Fraser-Cheam	3.	59.58	1.95	38.73	0.65
11 Central Fraser Valley	3.	35.01	2.80	32.68	0.93
12 Dewdney-Alouette	2.	39.32	0.66	12.98	0.33
13 Greater Vancouver	70.	66.23	68.82	65.12	0.98
14 Sunshine Coast	0.	0.0	0.0	0.0	0.0
15 Powell River	1.	51.49	0.99	50.98	0.99
16 Mount Waddington	0.	0.0	0.0	0.0	0.0
16a Central Coast	0.	0.0	0.0	0.0	0.0
17 Skeena-Queen Charlotte	0.	0.0	0.0	0.0	0.0
18 Kitimat-Stikine	0.	0.0	0.0	0.0	0.0
19 Bulkley-Nechako	0.	0.0	0.0	0.0	0.0
20 Fraser-Fort George	3.	38.62	2.77	35.67	0.92
21 Peace River-Liard	1.	22.81	0.19	4.33	0.19
22 Stikine	0.	0.0	0.0	0.0	0.0
23 Capital	17.	75.70	17.20	76.59	1.01
24 Cowichan Valley	2.	44.31	1.01	22.38	0.51
25 Nanaimo	4.	65.82	5.19	85.41	1.30
26 Alberni-Clayoquot	0.	0.0	0.0	0.0	0.0
27 Comox-Strathcona	1.	17.93	1.29	23.13	1.29
TOTAL	124.	51.53	117.80	48.96	0.95

[1] Ophthalmologists billing to MSC.

[2] Full Time Equivalents.

[3] Population Estimates obtained from, Population: Preliminary Counts, Statistics Canada. (1976 Census) Number is per 1,000,000 population.

Prepared by:

Health Manpower Research Unit
University of B.C.

Table 2: Number of MSC Active Ophthalmologists[1] and FTE[2] Ophthalmologists
adjusted for satellite practices
by Regional Hospital District in British Columbia

for the year May 1975 to April 1976.

Regional Hospital District	Adjusted[4] Number	Number per Population[3]	Number of FTE[2]	FTE[2] per Population[3]	Ratio FTE /Number
1 East Kootenay	1.00	21.85	1.02	22.28	1.02
2 Central Kootenay	1.00	20.87	0.87	18.16	0.87
2a Kootenay Boundary	1.00	31.95	0.99	31.63	0.99
3 Okanagan-Similkameen	2.00	39.47	2.34	46.18	1.17
4 Columbia-Shuswap	0.05	1.44	0.05	1.44	1.00
5 North Okanagan	2.95	64.42	2.99	65.29	1.01
6 Central Okanagan	5.00	72.34	3.58	51.79	0.72
7 Thompson-Nicola	4.01	44.41	3.18	35.22	0.79
8 Cariboo	0.09	1.78	0.09	1.78	1.00
9 Squamish-Lillooet	0.01	0.65	0.01	0.65	1.00
10 Fraser-Cheam	2.98	59.19	1.93	38.33	0.65
11 Central Fraser Valley	2.97	34.66	2.77	32.33	0.93
12 Dewdney-Alouette	2.46	48.36	1.12	22.02	0.46
13 Greater Vancouver	69.30	65.57	68.12	64.45	0.98
14 Sunshine Coast	0.0	0.0	0.0	0.0	0.0
15 Powell River	1.00	51.49	0.99	50.98	0.99
16 Mount Waddington	0.0	0.0	0.0	0.0	0.0
16a Central Coast	0.02	4.84	0.02	4.84	1.00
17 Skeena-Queen Charlotte	0.10	4.56	0.10	4.56	1.00
18 Kitimat-Stikine	0.10	2.62	0.10	2.62	1.00
19 Bulkley-Nechako	0.04	1.27	0.04	1.27	1.00
20 Fraser-Fort George	3.00	38.63	2.88	37.08	0.96
21 Peace River-Liard	1.11	25.32	0.19	4.33	0.17
22 Stikine	0.0	0.0	0.0	0.0	0.0
23 Capital	16.35	72.81	16.55	73.70	1.01
24 Cowichan Valley	2.45	54.28	1.46	32.35	0.60
25 Nanaimo	3.79	62.37	4.98	81.95	1.31
26 Alberni-Clayoquot	0.22	6.93	0.22	6.93	1.00
27 Comox-Strathcona	1.00	17.93	1.29	23.13	1.29
TOTAL	124.00	51.53	117.80	48.96	0.95

[1] Ophthalmologists billing to MSC.

[2] Full Time Equivalents.

[3] Population Estimates obtained from, Population: Preliminary Counts, Statistics Canada. (1976 Census) Number is per 1,000,000 population.

[4] Adjusted to account for time Ophthalmologist spends in region (proportion of week etc.)

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travelling clinic centres does allow for a degree of service in most regions, but the regional variation is not moderated to the degree that it should be to provide adequate services in all Regional Hospital Districts. In Table 2, the adjusted FTEs are presented as ratios to the population, and as ratios to the adjusted number of ophthalmologists in each regional district. It will be observed that the ratios to population vary from a low of 0.0 per million population (in Sunshine Coast, Mount Waddington and Stikine) to 81.95 per million population in Nanaimo. Comparisons between this table produced for Ophthalmologists and for Optometrists (Table 21) suggests that there is a relationship: e.g. Sunshine Coast has no ophthalmologists but has the highest ratio of optometrists to population in the Province. The ratio of FTE to the number of ophthalmologists is a measure of the "busyness" of the ophthalmologists: a figure above 1.00 means that the ophthalmologists are working "harder" than the provincial average in that particular regional district. This could be interpreted to mean that they are in short supply relative to the demand for their services. "Busy" regions appear to be Nanaimo (1.31) and Comox-Strathcona (1.29); conversely, regions that do not appear to be excessively "busy" are Peace River-Liard (0.17), Dewdney-Alouette (0..46) and Cowichan Valley (0.60). These estimates must obviously be interpreted with caution, since they are affected by semi-retired ophthalmologists continuing to maintain a small practice, the satellite clinics and the travelling clinics.[1]

Nearly 72% of the ophthalmologists in British Columbia are Canadian graduates (Table 3), yet only 6.72% have graduated from the University of British Columbia. It must be recalled that the small size of the graduating class from the University of British Columbia has limited the proportion of practicing physicians that are trained at U.B.C. to 15-16%; nevertheless the proportion of U.B.C. graduates which enters training programmes in ophthalmology must be small. In comparison to optometric manpower, the proportion of Canadian graduates practicing ophthalmology in all regions of the Province remains consistent at about 70%; in the case of optometry (Table 22, page 65), proportions at this level were only to be found in the non-Metropolitan areas of the Province.

The age distribution of Ophthalmologists in British Columbia, by Regional Hospital District, is shown in Table 4 as at September, 1976. The total provincial statistics by age are shown for 1976 in Fig. 3, where the cumulative distribution of ophthalmologists has been plotted by age. The median age of the current B.C. ophthalmologist is 47 years, some five years less than that found for optometrists (see Fig. 5). The proportion of ophthalmologists and optometrists at a young age is remarkably

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[1] The current practice developed by the College of Physicians and Surgeons when reviewing regional statistics, is to refer them for comment to the physicians in the area for interpretation.

Table 3: Number and Percent Distribution of Registered Ophthalmologists in British Columbia by Place of Graduation by Regional Hospital District as at September 18, 1975

Place of Graduation	Regional Hospital District							
	Greater Vancouver		Capital		Other B.C.		Total	
	Number	Percent[2]	Number	Percent[2]	Number	Percent[2]	Number	Percent[2]
Canadian Subtotal	51	73.91	13	72.22	22	68.75	86	72.27
Nova Scotia	0	0.0	0	0.0	1	3.13	1	0.84
Quebec	14	20.29	2	11.11	1	3.13	17	14.29
Ontario	18	26.09	2	11.11	7	21.88	27	22.69
Manitoba	6	8.70	4	22.22	4	12.50	14	11.76
Saskatchewan	1	1.45	1	5.56	1	3.13	3	2.52
Alberta	6	8.70	4	22.22	6	18.75	16	13.45
British Columbia	6	8.70	0	0.0	2	6.25	8	6.72
Non-Canadian Subtotal	18	26.09	5	27.78	10	31.25	33	27.73
South America Subtotal	0	0.0	0	0.0	1	3.13	1	0.84
Uruguay	0	0.0	0	0.0	1	3.13	1	0.84
Europe Subtotal	13	18.84	4	22.22	8	25.00	25	21.01
Irish Republic (Eire)	0	0.0	0	0.0	1	3.13	1	0.84
Switzerland	2	2.90	0	0.0	0	0.0	2	1.68
United Kingdom	10	14.49	4	22.22	7	21.88	21	17.65
Yugoslavia	1	1.45	0	0.0	0	0.0	1	0.84
Asia Subtotal	1	1.45	1	5.56	0	0.0	2	1.68
China	0	0.0	1	5.56	0	0.0	1	0.84
Formosa (Nationalist China)	1	1.45	0	0.0	0	0.0	1	0.84
Africa Subtotal	2	2.90	0	0.0	0	0.0	2	1.68
South Africa	2	2.90	0	0.0	0	0.0	2	1.68
Oceania Subtotal	2	2.90	0	0.0	1	3.13	3	2.52
Australia	0	0.0	0	0.0	1	3.13	1	0.84
New Zealand	2	2.90	0	0.0	0	0.0	2	1.68
TOTAL	69	100.00	18	100.00	32	100.00	119	100.00

---

[2] Percentages may not add due to rounding

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Table 4: Number of Directory Active Ophthalmologists[1] by Age as at September 1976

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	0	1	0	0	0	0	0	1
2	Central Kootenay	0	0	1	0	0	0	0	0	1
2a	Kootenay Boundary	0	0	1	0	0	0	0	0	1
3	Okanagan-Similkameen	0	0	1	1	0	0	0	0	2
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	1	0	1	1	0	0	0	3
6	Central Okanagan	0	0	1	3	1	0	0	0	5
7	Thompson-Nicola	0	0	2	2	0	0	0	0	4
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	1	1	0	0	0	0	2
11	Central Fraser Valley	0	3	1	0	0	0	0	0	4
12	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
13	Greater Vancouver	0	8	21	22	14	6	0	0	71
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	1	0	0	0	0	0	0	1
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Central Coast	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	1	2	0	0	0	0	3
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	1	3	7	4	1	2	1	19
24	Cowichan Valley	0	1	0	0	0	0	0	0	1
25	Nanaimo	0	0	2	1	2	0	0	0	5
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	1	0	0	0	0	0	1
TOTAL		0	15	37	40	22	7	2	1	124

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[1] Includes ophthalmologists on the temporary register

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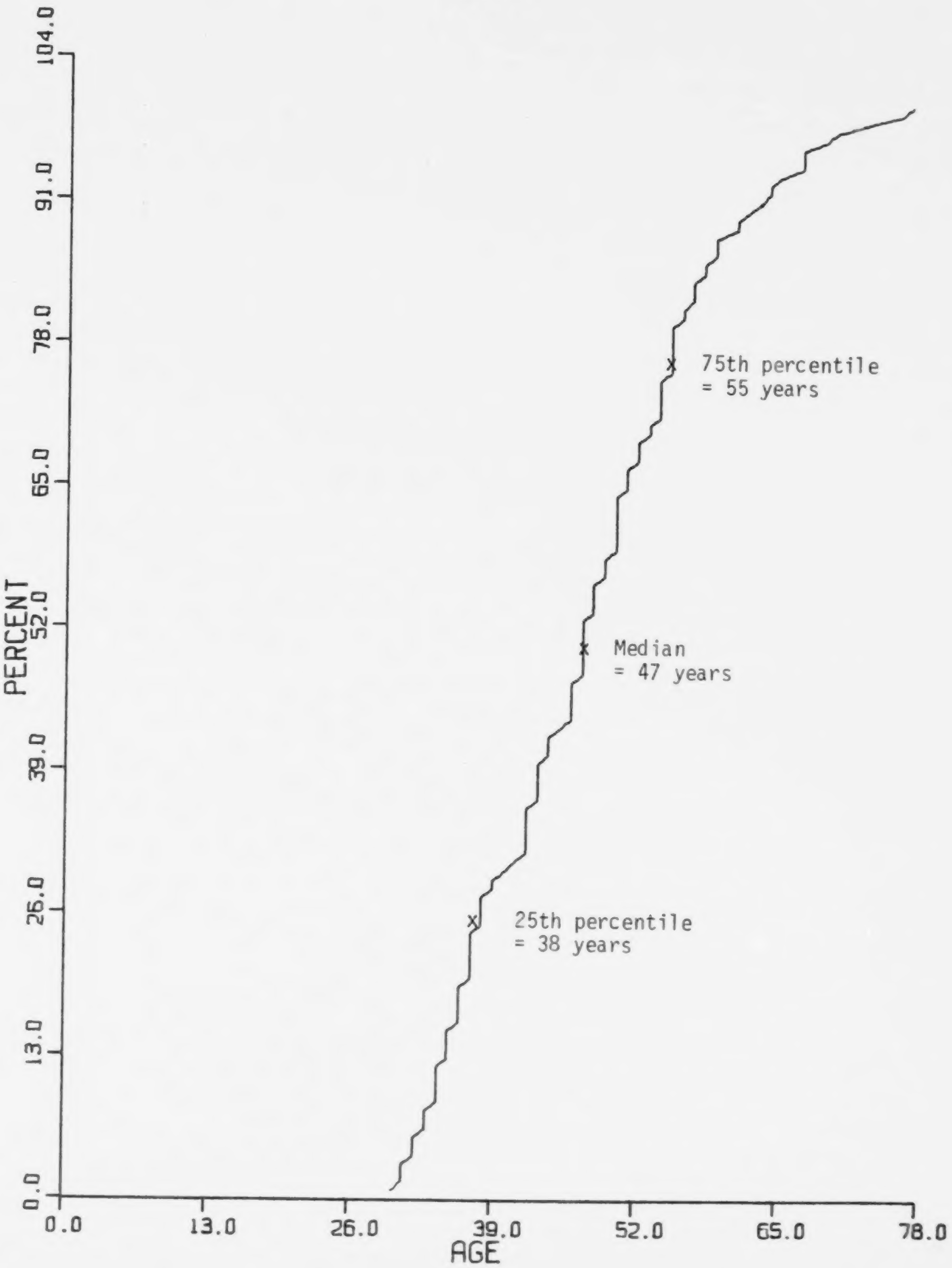
FIGURE 3

OPHTHALMOLOGISTS BY AGE

1976



similar (both have the 25th percentile of the distribution at approximately 37-38 years of age); similarly, both have the 75th percentile of the distribution at approximately 55-56 years of age. Aging, however, will cause a greater attrition of optometrists over ophthalmologists in the next 10 years (Tables 4 and 23)

Optometric and Ophthalmologic manpower trends, from 1956 to 1976 are illustrated in Table 5.[1] There has been a very large increase in ophthalmic manpower over this time period: in 1960, for example, there were approximately 3.5 optometrists for every ophthalmologist, but by 1976 this ratio had declined to 1.3 optometrists for every ophthalmologist. Although still not superior in numbers to the Optometrist, the Ophthalmologist clearly dominates the provision of vision care in British Columbia.[2] In recent years, additions to the ophthalmologic manpower stock has been moderated somewhat. It is interesting to note that the manpower trends for the time period 1967 to 1976 plotted in Fig. 4 indicate that the stocks of ophthalmologists

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[1] The numbers and ratios in Table 5 differ from those in other tables because they are not restricted to MSC-Active practitioners.

[2] Shillington and Anderson (1974) speculated that the present high level of ophthalmologic manpower was the consequence of an inappropriate stimulus to ophthalmic training produced by the Hall Royal Commission on Health Services of 1964 which recommended rapid expansion in these programmes with special training grants. They noted that the impact of this recommendation will be felt over the next 20 to 30 years, and concluded that any attempt to coordinate the vision care system by altering the production of any one group over the short run, should be exceedingly cautious.

Table 5: Number, and Number per 1,000,000 Population of Ophthalmologists[1] and Optometrists[2] in British Columbia from 1956 to 1976

Year	Optometrists		Ophthalmologists	
	Number	Number per Population	Number	Number per Population
1956	-	-	33	23.59
1957	-	-	34	22.94
1958	-	-	38	24.71
1959	-	-	42	26.80
1960	143	88.99	46	28.71
1961	138	84.72	50	30.69
1962	140	84.34	53	31.93
1963	136	81.49	60	35.95
1964	132	75.65	63	36.10
1965	135	75.13	66	36.72
1966	138	73.64	72	38.42
1967	138	70.77	74	37.95
1968	143	71.29	80	39.88
1969	144	69.73	82	39.71
1970	145	67.95	93	43.58
1971	149	68.10	96	43.88
1972	147	65.28	108	47.96
1973	152	65.52	114	49.14
1974	151	62.86	117	48.71
1975	160	64.99	119	48.33
1976	162	65.03	122	48.98

[1] As recorded by the College of Physicians and Surgeons of British Columbia

[2] Optometrists registered under the Optometry Act, Province of British Columbia

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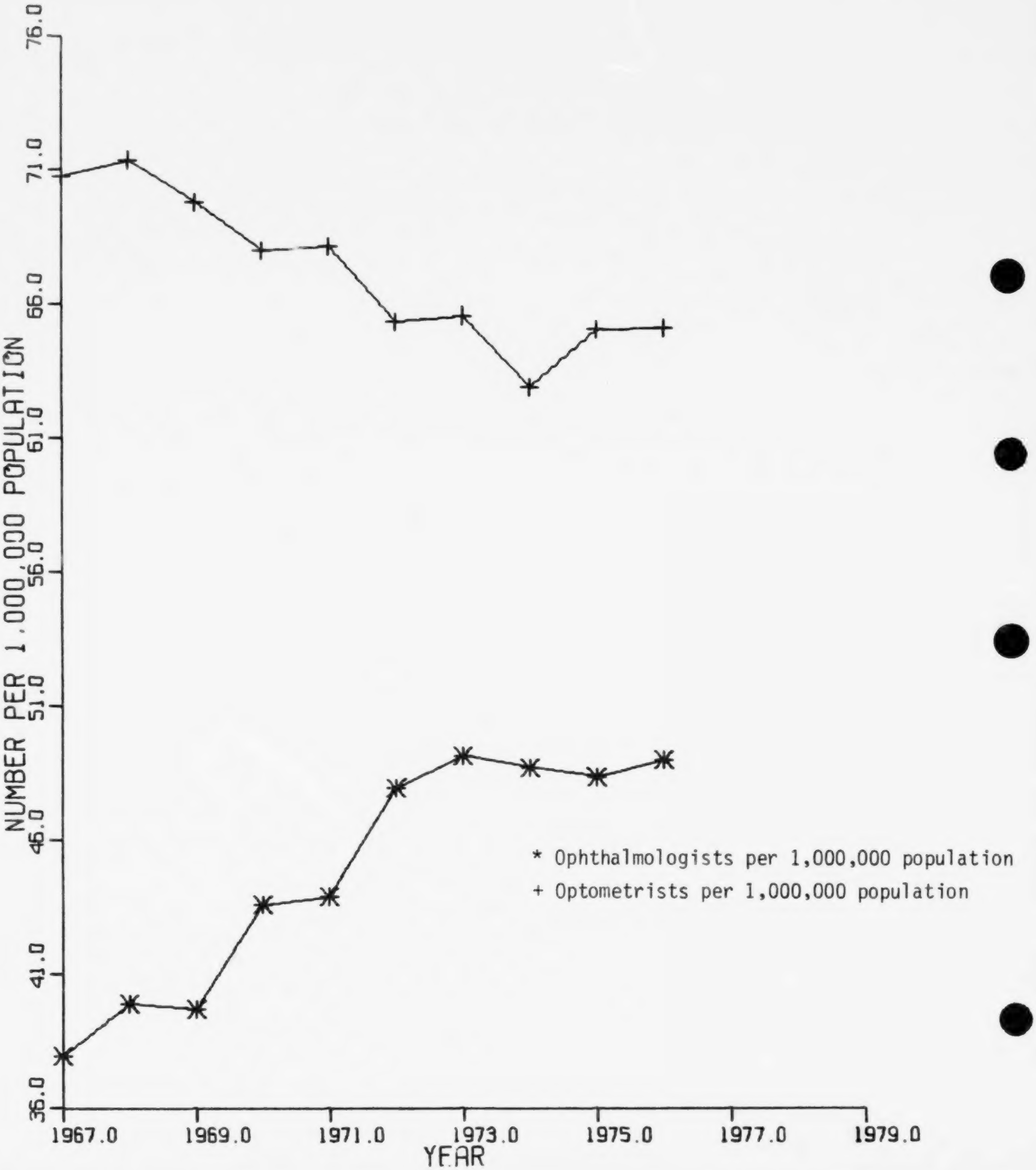
Health Manpower Research Unit
University of B.C.

FIGURE 4

OPHTHALMOLOGISTS & OPTOMETRISTS PER 1,000,000 POPULATION

1967 - 1976



and of optometrists have changed in a mirror image fashion, and that the stock, expressed as a ratio to the population is now stable.

The age distribution of ophthalmologists in British Columbia in 1972 is shown in Table 6. A comparison of Table 4 and Table 6 reveals that a large number of younger ophthalmologists have entered the Greater Vancouver Regional Hospital District in contrast to the situation for optometrists.

The changes in ophthalmologic manpower stock between 1972 and 1976 are summarized in Table 7. Three regions have lost practitioners without obtaining a replacement: Fraser-Cheam, Dewdney-Alouette, Comox-Strathcona. On the other hand many other regions have gained ophthalmologists. The largest net increase, five out of a total of 15, is found to be in the Greater Vancouver Regional Hospital District, a finding identical to that noted for optometrists.

Table 8 indicates the number of ophthalmologists involved in attrition by age group from September 1972 to September 1976. This date corresponds with the date of printing of the annual Medical Directory by the College of Physicians and Surgeons of B.C. Two thirds of the 15 ophthalmologists who dropped out of practice in B.C. were of retirement age. Two other ophthalmologists who were previously registered in the Province were reactivated during this period. In addition, 28 new ophthalmologists immigrated and registered in British Columbia between 1972 and 1976: the statistics are shown in Table 9, by Regional Hospital District. Only six of the 28 new registrants

Table 6: Number of Directory Active Ophthalmologists[1] by Age

as at September 1972

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	0	1	0	0	0	0	0	1
2	Central Kootenay	0	0	1	0	0	0	0	0	1
2a	Kootenay Boundary	0	0	1	0	0	0	0	0	1
3	Okanagan-Similkameen	0	0	1	1	0	0	0	0	2
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	0	0	1	1	0	0	0	2
6	Central Okanagan	0	0	0	3	0	0	0	0	3
7	Thompson-Nicola	0	0	1	2	0	0	0	0	3
8	Cariboo	0	0	0	0	0	0	0	0	[illegible]
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	2	0	1	0	0	3
11	Central Fraser Valley	0	1	0	0	0	0	0	0	1
12	Dewdney-Alouette	0	0	1	0	0	0	0	0	1
13	Greater Vancouver	0	1	15	24	14	9	3	0	66
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls[2]	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	1	1	0	0	0	0	[illegible]
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	0	8	4	2	2	0	16
24	Cowichan Valley	0	0	0	0	0	0	1	0	1
25	Nanaimo	0	0	1	0	3	0	0	0	4
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	1	0	0	0	1	0	2
Total		0	2	24	42	22	12	7	0	107

---

[1] Includes Ophthalmologists on the temporary register

[2] Now called Central Coast.

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Table 7: Changes in the Number of Directory Active Ophthalmologists[1] from September 1972 as at September 1976

Regional Hospital District		New Registrants[2]							
	1972	B.C.	Other Canada	Foreign	Acti-vations	Total	Attr'n	Migr'n	1976
1 East Kootenay	1	0	0	0	0	0	0	0	1
2 Central Kootenay	1	0	0	0	0	0	0	0	1
2a Kootenay Boundary	1	0	0	0	0	0	0	0	1
3 Okanagan-Similkameen	2	0	0	0	0	0	0	0	2
4 Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5 North Okanagan	2	0	1	0	0	1	0	0	3
6 Central Okanagan	3	0	0	1	0	1	0	1	5
7 Thompson-Nicola	3	0	0	1	0	1	0	0	4
8 Cariboo	0	0	0	0	0	0	0	0	0
9 Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10 Fraser-Cheam	3	0	1	0	0	1	1	-1	2
11 Central Fraser Valley	1	1	1	1	0	3	0	0	4
12 Dewdney-Alouette	1	0	0	0	0	0	1	0	0
13 Greater Vancouver	66	3	6	5	1	15	9	-1	71
14 Sunshine Coast	0	0	0	0	0	0	0	0	0
15 Powell River	0	0	0	1	0	1	0	0	1
16 Mount Waddington	0	0	0	0	0	0	0	0	0
16a Central Coast	0	0	0	0	0	0	0	0	0
17 Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18 Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19 Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20 Fraser-Fort George	2	1	0	0	0	1	0	0	3
21 Peace River-Liard	0	0	0	0	0	0	0	0	0
22 Stikine	0	0	0	0	0	0	0	0	0
23 Capital	16	0	2	1	1	4	2	1	19
24 Cowichan Valley	1	1	0	0	0	1	1	0	1
25 Nanaimo	4	0	0	1	0	1	0	0	5
26 Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27 Comox-Strathcona	2	0	0	0	0	0	1	0	1
TOTAL	109	6	11	11	2	30	15	0	124

---

[1] Includes ophthalmologists on the temporary register.

[2] Ophthalmologists who were active in B.C. in 1976 but not in 1972.

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Table 8: Number of Attritions from Directory Active Ophthalmologists[1] from September 1972 to September 1976

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	0	0	0	0	0	0	0	0
2	Central Kootenay	0	0	0	0	0	0	0	0	0
2A	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	0	0	0	0	0	0	0	0
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	0	0	0	0	0	0	0	0
6	Central Okanagan	0	0	0	0	0	0	0	0	0
7	Thompson-Nicola	0	0	0	0	0	0	0	0	0
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	0	0	1	0	0	1
11	Central Fraser Valley	0	0	0	0	0	0	0	0	0
12	Dewdney-Alouette	0	0	1	0	0	0	0	0	1
13	Greater Vancouver	0	0	0	2	1	3	3	0	9
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16A	Ocean Falls[2]	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	0	0	0	0	0	0	0
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	0	1	0	1	0	0	2
24	Cowichan Valley	0	0	0	0	0	0	1	0	1
25	Nanaimo	0	0	0	0	0	0	0	0	0
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	1	0	1
Total		0	0	1	3	1	5	5	0	15

---

[1] Includes Ophthalmologists on the temporary register

[2] Now called Central Coast

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Table 9: Immigration and Registration of Directory Active Ophthalmologists[1]
from September 1972 to September 1976

All Schools of Graduation

Total

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
	East Kootenay	0	0	0	0	0	0	0	0	0
2	Central Kootenay	0	0	0	0	0	0	0	0	0
2a	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	0	0	0	0	0	0	0	0
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	1	0	0	0	0	0	0	1
6	Central Okanagan	0	0	1	0	0	0	0	0	1
7	Thompson-Nicola	0	0	1	0	0	0	0	0	1
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	1	0	0	0	0	0	1
11	Central Fraser Valley	0	2	1	0	0	0	0	0	[illegible]
	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
	Greater Vancouver	0	6	7	0	1	0	0	0	14
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	1	0	0	0	0	0	0	1
16	Mount Waddington	0	0	0	0	0	0	0	0	1
16a	Ocean Falls[2]	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	0	1	0	0	0	0	1
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
22	Stikine	0	0	0	0	0	0	0	0	0
	Capital	0	1	2	0	0	0	0	0	3
	Cowichan Valley	0	1	0	0	0	0	0	0	1
25	Nanaimo	0	0	1	0	0	0	0	0	1
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		0	12	14	1	1	0	0	0	28

---

[1] Includes Ophthalmologists on the temporary register

[2] Now called Central Coast

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graduated from the University of British Columbia, (Table 10), half of whom settle at least initially in Vancouver. The remaining 22 new registrants are equally divided between graduates of other Canadian medical schools (Table 11) and foreign medical schools (Table 12). Again, about half of these new registrants move into the Greater Vancouver Regional District. Foreign Medical Graduates, however, belong to an older group, and are in the main 35-44 years of age at the time they qualify for registration in British Columbia. These statistics for ophthalmologists are in striking contrast to those for optometrists, where nearly 80% of the new registrants over the same time period were graduates of a single Ontario university, Waterloo.

e. Workload of Ophthalmologists

Ophthalmologists provide services for both functional and disease problems relating to the eye. Refractions, contact lens therapy and orthoptics form the major area of treatment for functional disorders, while a great variety of services are offered in the treatment of diseases. A majority of the services performed by ophthalmologists are insured under the Medical Services Plan of British Columbia. The two service categories which constitute the major portion of the ophthalmologist's case load of functional disorders are outlined below: (BCMA, 1977)

> Fee Code 2010. Consultation. This includes history, eye examination, review of x-rays and laboratory findings, and any or all of measurement for refractive error, ophthalmoscopy, biomicroscopy, tonometry, eye balance test,

Table 10: Immigration and Registration of Directory Active Ophthalmologists[1]
from September 1972 to September 1976

GRADUATION: from U.B.C.

Total

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	0	0	0	0	0	0	0	0
	Central Kootenay	0	0	0	0	0	0	0	0	0
	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	0	0	0	0	0	0	0	0
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	0	0	0	0	0	0	0	0
6	Central Okanagan	0	0	0	0	0	0	0	0	0
7	Thompson-Nicola	0	0	0	0	0	0	0	0	0
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	0	0	0	0	0	0
11	Central Fraser Valley	0	0	1	0	0	0	0	0	1
12	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
13	Greater Vancouver	0	1	2	0	0	0	0	0	3
	Sunshine Coast	0	0	0	0	0	0	0	0	0
	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls[2]	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	0	1	0	0	0	0	1
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	0	0	0	0	0	0	0
24	Cowichan Valley	0	1	0	0	0	0	0	0	1
	Nanaimo	0	0	0	0	0	0	0	0	0
	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		0	2	3	1	0	0	0	0	6

---

[1] Includes Ophthalmologists on the temporary register

[2] Now called Central Coast

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Table 11: Immigration and Registration of Directory Active Ophthalmologists[1]
from September 1972 to September 1976

GRADUATION: from Other Canadian Medical Schools (excluding U.B.C.)

Total

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	0	0	0	0	0	0	0	0
2	Central Kootenay	0	0	0	0	0	0	0	0	0
2a	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	0	0	0	0	0	0	0	0
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	1	0	0	0	0	0	0	1
6	Central Okanagan	0	0	0	0	0	0	0	0	0
7	Thompson-Nicola	0	0	0	0	0	0	0	0	0
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	1	0	0	0	0	0	1
11	Central Fraser Valley	0	1	0	0	0	0	0	0	1
12	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
13	Greater Vancouver	0	4	2	0	0	0	0	0	6
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls[2]	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	0	0	0	0	0	0	0
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	1	1	0	0	0	0	0	2
24	Cowichan Valley	0	0	0	0	0	0	0	0	0
25	Nanaimo	0	0	0	0	0	0	0	0	0
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		0	7	4	0	0	0	0	0	[illegible]

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[1] Includes Ophthalmologists on the temporary register

[2] Now called Central Coast

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University of British Columbia

Table 12: Immigration and Registration of Directory Active Ophthalmologists[1]
from September 1972 to September 1976

GRADUATION: from Foreign Medical Schools

Total

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	0	0	0	0	0	0	0	0
2	Central Kootenay	0	0	0	0	0	0	0	0	0
2a	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	0	0	0	0	0	0	0	0
	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
	North Okanagan	0	0	0	0	0	0	0	0	0
	Central Okanagan	0	0	1	0	0	0	0	0	1
7	Thompson-Nicola	0	0	1	0	0	0	0	0	1
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	0	0	0	0	0	0
11	Central Fraser Valley	0	1	0	0	0	0	0	0	1
12	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
13	Greater Vancouver	0	1	3	0	1	0	0	0	5
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	1	0	0	0	0	0	0	1
16	Mount Waddington	0	0	0	0	0	0	0	0	0.
a	Ocean Falls[2]	0	0	0	0	0	0	0	0	0
	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	0	0	0	0	0	0	0
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	1	0	0	0	0	0	1
24	Cowichan Valley	0	0	0	0	0	0	0	0	0
25	Nanaimo	0	0	1	0	0	0	0	0	1
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		0	3	7	0	1	0	0	0	11

---

[1] Includes Ophthalmologists on the temporary register

[2] Now called Central Coast

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> keratometry, where indicated and necessary to prepare a written report.
>
> Fee Code 2015, Eye Examination. (This is included in the consultation or visit fee when applicable). This includes the measurement of refractive error, ophthalmoscopy, and any or all of biomicroscopy, tonometry, eye balance test, and keratometry, where indicated.

The measurement of refractive error is only one part of the refractive service provided by the ophthalmologist, just as it is for the "refraction" carried out by an optometrist. The ophthalmological description of "refraction" is interpreted as "one part of a complete eye examination. A complete eye examination includes a general medical and ophthalmic history, pupillary reactions, measurement of refractive error, ophthalmoscopy, biomicroscopy, applanation tonometry, ocular muscle balance, keratometry, visual fields, diagnosis and treatment. Treatment may or may not include a prescription for spectacles."(Elliot, 1977).

Ophthalmologists also distinguish between refractometry (the measurement of refractive error) and the exercise of clinical judgment which takes place during a consultation.

> Accurate refractometry is essential to good eyecare but it can be done well, both objectively and subjectively, by technicians and, in many cases, just as well by a machine. We ophthalmologists have a time-honored tradition of delegating this task of refractometry to our assistants. On the other hand, the exercise of clinical judgment is the responsibility of the practitioner...We should never try to delegate to our assistants the responsibility for the exercise of clinical judgment. (Appleton, 1977).

The following tables outline the insured workload performed by ophthalmologists practicing in British Columbia and for which they have billed the Medical Services Plan; only vision care services and consultations have been studied.

Table 13 shows the number of services performed both by ophthalmologists and optometrists through the years 1970 to 1973; of particular interest are the services provided by ophthalmologists in the fields of consultation (Fee code 2010), refraction (2015) and tonometry (2019). It must be stressed that ophthalmologists will perform vision care services for patients referred to them by general practitioners (i.e., secondary or referral care), as well as perform these services directly to patients who "walk in" (i.e., primary care). Therefore, to confine any study of refractive services performed by ophthalmologists to Fee code 2015 would be to exclude a certain number which are carried out during the process of a consultation. From Table 13, it can be noted that substantial increases in the number of services provided by ophthalmologists have occurred during the period 1970 to 1976, with the exception of consultations (2010) which levelled off in 1973-74, declined in 1975 and then increased again in 1976. It is uncertain why this has occurred, but may be due to restrictions in payments or other economic factors which characterized the practice of ophthalmology in 1975.

Table 14 shows the mean number of refractions (or visual examinations) performed per optometrist and ophthalmologist through the years 1970 to 1976. The denominators for these

Table 13: Number of Services Paid by the Medical Services Commission of British Columbia

Fiscal Year Ending March 31st	Ophthalmology			Optometry		
	2010	2015	2019	2899	2898[1]	2897[1]
1970	38698	141155	34297	150090	---	---
1971	47284	142213	37026	153762	---	----
1972	60031	137253	41366	145240	---	---
1973	61871	151984	46418	151369	849	265
1974	61266	174831	49815	167934	3082	667
1975	54730	209054	50669	194880	9132	987
1976	71000	233476	55914	218547	14234	1501

[1] Items 2897 and 2898 were not included as insured services until July 1, 1972

Ophthalmology

2010 - Consultation
2015 - Refraction
2019 - Tonometry

Optometry

2899 - Refraction
2898 - Re-examination, minor examination
2897 - Tonometry

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Table 14: Refraction Services per Registered Optometrist[1] per Licenced Ophthalmologist[2]

YEAR	Refraction Services/ Optometrist	Refraction Services/ Ophthalmologist
1970	1035.10	1933.90
1971	1031.96	1973.93
1972	988.03	1826.70
1973	996.85	1875.92
1974	1112.15	2017.92
1975	1218.00	2216.67
1976	1349.06	2495.70

[1] Medical Services Commission Code (2899)

[2] Medical Services Commission Codes (2010 + 2015)

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ratios are the optometrists and ophthalmologists registered or licensed to practice in British Columbia, and therefore do not adjust for the activities of semi-retired professionals. It is noteworthy that the mean number of refractive services for both optometrists and ophthalmologists declined during 1972 and 1973. Rapid increases in productivity (in terms of refractions) have since occurred, and the productivity increase for optometrists and ophthalmologists is virtually identical (See figures 8, 10, and 12).

The statistical information on the distribution of MSC Active optometrists and ophthalmologists on or about April, 1976 is merged and summarized in Table 15; adjustments have been made for satellite practices. The merging of the two types of personnel in no way obliterates the marked regional variation. Large discrepancies in regional vision care manpower exist, and will be evaluated in a later section.

4. THE OPTOMETRIST

a. Definition and Role

The Optometrist is a Doctor of Optometry and a graduate from a recognized School of Optometry.

The Optometrist acts as a primary contact practitioner in the vision and eye care field, providing care for the healthy but inadequate visual system. The Optometrist determines the functional status of the visual system, the quantitative and

Table 15: Number of MSC Active Vision Care Personnel[1] and FTE[2] Vision Care Personnel by Regional Hospital District in British Columbia for the year May 1975 to April 1976

Regional Hospital District	Number	Number per Population[3]	Number of FTE[2]	FTE[2] per Population[3]	Ratio FTE /Number
1 East Kootenay	6.	13.11	5.86	128.02	0.98
2 Central Kootenay	6.	12.52	4.74	98.91	0.79
2a Kootenay Boundary	4.	12.78	4.44	141.87	1.11
3 Okanagan-Similkameen	6.	11.84	5.46	107.75	0.91
4 Columbia-Shuswap	3.	8.62	1.46	41.95	0.49
5 North Okanagan	6.	13.10	5.52	120.54	0.92
6 Central Okanagan	9.	13.02	6.94	100.40	0.77
7 Thompson-Nicola	13.	14.40	13.39	148.29	1.03
8 Cariboo	3.	5.92	2.84	56.05	0.95
9 Squamish-Lillooet	0.	0.0	0.0	0.0	0.0
10 Fraser-Cheam	5.	9.93	3.53	70.11	0.71
11 Central Fraser Valley	6.	7.00	5.42	63.25	0.90
12 Dewdney-Alouette	4.	7.86	3.28	64.48	0.82
13 Greater Vancouver	146.	13.81	130.93	123.88	0.90
14 Sunshine Coast	1.	8.16	1.22	99.61	1.22
15 Powell River	2.	10.30	1.69	87.02	0.84
16 Mount Waddington	0.	0.0	0.0	0.0	0.0
16a Central Coast	0.	0.0	0.0	0.0	0.0
17 Skeena-Queen Charlotte	2.	9.13	1.37	62.51	0.68
18 Kitimat-Stikine	2.	5.25	2.96	77.69	1.48
19 Bulkley-Nechako	0.	0.0	0.0	0.0	0.0
20 Fraser-Fort George	8.	10.30	10.68	137.52	1.34
21 Peace River-Liard	5.	11.40	3.64	83.03	0.73
22 Stikine	0.	0.0	0.0	0.0	0.0
23 Capital	32.	14.25	29.56	131.63	0.92
24 Cowichan Valley	3.	6.65	1.95	43.20	0.65
25 Nanaimo	8.	13.16	8.77	144.32	1.10
26 Alberni-Clayoquot	3.	9.45	2.02	63.65	0.67
27 Comox-Strathcona	4.	7.17	4.15	74.42	1.04
TOTAL	287.	119.30	261.74	108.78	0.91

[1] Ophthalmologists and Optometrists billing to MSC.

[2] Full Time Equivalents.

[3] Population Estimates obtained from, Population: Preliminary Counts, Statistics Canada. (1976 Census) Number is per 1,000,000 population.

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qualitative evaluation of the refractive, accommodative, oculomotor, and perceptual components (CAO, 1975). He prescribes and applies corrective and preventive devices and procedures for anomalies thereof. In the vision examination process he is expected to detect and refer any suspected disease condition found.

b. Training of Optometrists

Within the Faculty of Science, the School of Optometry at the University of Waterloo offers a five year programme (after Grade 13) leading to the degree of Doctor of Optometry. The first year is pre-professional, preparatory to a four year professional program.[1]

The optometry student receives a comprehensive education in the basic sciences as well as specific instruction in optometric theory and practice. The pre-professional year is a basic science course which includes mathematics, chemistry, biology, physics and psychology.(Appendix IV, U of Waterloo Curriculum) The University of Montreal offers a three year course leading to a Licentiate in Optometry. This qualification does not entitle graduates to practice in provinces other than Quebec, without first writing the required provincial examinations.

The optometry student at Waterloo has direct clinical experience in the second, third and fourth professional years. The majority of experience is gained in the third and fourth professional years, and in a summer clinic period between terms. Internes examine an average of 491 patients in the course of their clinical training, which includes general visual examinations and examinations in binocular vision, paediatric and geriatric clinics. In addition, each class participates in the training of 330 patients with binocular problems and each interne has management of an average of 21 contact lens patients.

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[1] In the Province of B.C., high school graduates would require two academic years before entrance into the professional programme.

It can be noted that the fixed total number of hours of instruction in optics and refractions for optometry students is 1608. The average total number of hours which each student has in patient care is 1488. Table 16 gives a breakdown of the clinical experience which optometry students receive at Waterloo.

There appears to be some concern about training in ocular pathology. The Director of the School of Optometry (Woodruff, 1977) notes that although the School has difficulty in obtaining the cooperation of Canadian Ophthalmologists to give the necessary courses, the training programme in ocular pathology is of high quality. Some Ophthalmologists however have reservations about this course of studies. On the other hand, it should be noted that this concern is not shared by all ophthalmologists, some of whom refer to the school clinic at Waterloo. The quality of training is well established by the standards of courses and instruction.

Table 16: Clinical Training in Optometry (B.C.O.A., 1977)

1. Clinical Care of Patients	Specific Clinic Rotations		
	General	Diagnosis and Correction of Vision problems by spectacles	
	Ocular Health Assessment	Detection and diagnosis of ocular pathology or general health problems	
	Binocular Vision	Diagnosis and therapy of faults of eye teaming	
	Contact Lens	Correction of vision anomalies by hard and soft contact lenses	
	Dispensary		
2. Summer Clinic	One Month of Clinical Care on Daily Basis		
3. Summer Clinical Programs (Prerequisite - Successful completion of 1 and 2)	4 months of Clinical Care to Patient Populations		Number of Internes (Varies annually)
	1. Amerind Peoples - General and Pediatric		21
	2. Geriatric Populations - Institutions and Community		8
	3. Mentally Retarded - Institutions and Community		5
	4. General Clinic - All areas		14
	5. Caribbean Peoples		4
	6. Hutterite Populations - Epidemiology Survey		2
	7. Contact Lens Clinic		4
	8. Red Lake Hospital Clinic		2
4. Optometry Clinic 4th Professional Year	Clinical Care of Patients		
	3 Days per week with rotations in the following clinics or services:		
	Clinics - General Patient Care and Dispensary - University and Conestoga Community College		
	Low Vision	Electrodiagnosis	
	Contact Lens	Ultrasound	
	Pediatric	Geriatric	
	Learning Difficulties	Binocular Vision	
	Mental Retardation	Industrial and Environmental Vision	
	Services - Ocular Health Assessment Service		
	Pediatric Fields Service - Vision Screening, Well Babies, Nursery School Children, School Children		
	Geriatric Field Service - Vision & glaucoma screening of senior citizens, housecalls.		
	Colour Vision Assessment		
	Internal and External Eye Photography		

The majority of optometrists who practice in British Columbia graduate from the School of Optometry at the University of Waterloo and a small number from American Schools. The School of Optometry at the University of Waterloo, and all Optometry schools in the United States are accredited by the profession's official accrediting body, the Council on Optometric Education of the American Optometric Association. This body is under the umbrella of the National Commission on Accreditation, the U.S. agency for all university programmes.

Every person wishing to practice Optometry in British Columbia must pass an examination set by the Board of Examiners of the British Columbia Optometric Association. Section 12(a) from the Regulations under the Optometry Act outlines the necessary requirements that the candidate for examination must meet:

> 12(a) Every applicant for examination shall possess scholastic standing equivalent to that required to obtain University Entrance Standing in British Columbia and shall have successfully completed a course in optometry in a school of optometry or University approved by the Board, or shall have practised optometry continuously elsewhere than in British Columbia for a period of five years immediately preceding his application to practise optometry in the Province of British Columbia and shall have attained such scholastic standing and training in optometry in schools of optometry, universities, or other institutions as may from time to time be approved by the Board.

At the present time the University of Waterloo prepares an examination which is used by the Examining Board of the Province of British Columbia. There is a movement towards a national examination in this discipline.

The University of Waterloo School of Optometry is the only English-language training centre for optometrists in Canada. This particular School has a stated obligation to meet the needs of the Province of Ontario for optometric manpower (Woodruff, 1976). At the present time, 60 students can be accommodated, but in the opinion of the Director of the School, the School's clinical facilities are being "taxed to the limit", and "the Faculty wish to reduce the class size to 50". Attrition has not occured from the matriculation class of 60. The Director has noted (Woodruff, 1976):

> The number of graduates entering practice in Ontario has been judged by the Ministry of Health and the College of Optometrists to be in balance with Ontario's population increase, attrition, and other factors if 40 graduates enter practice each year. This equation has now been altered by the signing of a contractual agreement with the three prairie provinces for 13 spaces. This was their average occupancy rate per Optometry year at the time negotiations began. Thus, taking 40 students from Ontario, 13 from three Western Provinces, only seven spaces are left for distribution among the Maritimes, Quebec and British Columbia. Based on population ratios, the Maritimes have greatest need and we thus allocate 5 spaces to those 4 provinces and 1 each to British Columbia and Quebec, reserving the right to change these on the basis of academic qualifications and the other factors considered by the admittance committee. It is unlikely that under present arrangements more than 2 students from British Columbia would be admitted any year and in most years 1 student would be admitted.

These changes have been accomplished through the direct negotiation by the Western Canada Post-secondary Education Coordinating Committee with the School. British Columbia withdrew from these negotiations prior to the establishment of this Vision Care Task Force.

Discussions have been held between the University of Victoria and the University of Waterloo in regard to academic support of an optometry training programme at the University of Victoria. While no formal agreement exists (Woodruff, 1976), the University of Waterloo has considered the possibility of conjoint operation over four or five years during the developmental phase, and possibly accepting up to ten students for the academic portion of the curriculum, clinical facilities and summer clinical programmes being provided in the Province of British Columbia.

The total number of optometric graduates in Canada in 1977 can be estimated to be about 100 (Table 17), with approximately 60 percent of these graduating from the English-language school at Waterloo. British Columbia has, in the time period 1968 to 1973, been a donor province. The province sent 13 students to Waterloo, and received back only 11, recruiting one student from Saskatchewan, and bringing back only 10 of the original 13 British Columbian students (Table 18). On the other hand, during the more recent period 1972 to 1976 the net gain in total optometric manpower has been 15 (Table 19).

c. Legislation and Regulations governing Optometrists

In the Province of British Columbia, optometrists are

Table 17: Graduates from Schools of Optometry, Canada, 1968 - 1978*

	Graduates										
SCHOOL	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
U. of Montreal	12	13	22	23	21	38	30	38	41	42	42
U. of Waterloo	23	21	35	¤	27	44	58	56	52	58	56
TOTAL	35	34	57	23	48	82	88	94	93	100	98

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* Sources: Robertson et al, (1973) and Woodruff (1977)

¤ No graduation, as course changed from three to four professional years in 1971.

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Table 18: Province of Origin and Province of Practice

Waterloo Graduates, 1968 - 1973#

ORIGIN	Nfld.	N.S.	P.E.I.	N.B.	P.Q.	Ont.	Man.	Sask.	Alta.	B.C.	Other
Nfld	-	--	-	-	-	-	-	-	-	-	-
N.S.	2	2	-	-	-	-	-	-	-	-	-
P.E.I.	-	-	-	-	-	-	-	-	-	-	-
N.B.	-	-	-	5	-	-	-	-	-	-	-
P.Q.	-	-	-	-	-	-		-	-	-	-
Ont.	-	-	-	-	-	49	-	-	2	-	-
Man.	-	-	-	-	-	2	8	-	1	-	-
Sask.	-	-	-	-	-	3	2	16	4	1	-
Alta.	-	-	-	-	-	1	-	-	13	-	-
B.C.	-	-	-	-	-	2	-	-	1	10	-
Other	-	1	-	-	-	3	-	-	-	-	8▪
Total Origin	0	4	0	5	0	51	11	26	14	13	12
%*	0	3.2	0	4.0	0	41.1	8.9	21.0	11.3	10.5	
Total Practice	2	3	0	5	0	63	10	16	21	11	8
%*	1.6	2.3	0	3.9	0	49.2	7.8	12.5	16.4	8.6	
% of population**	3.3	.7	5.1	4.1	-	50.0	6.4	6.0	10.5	14.1	

for 136 graduates where data are available

* of Canadian

** Canadian excluding Quebec

▪ Other than Canada

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Table 19: Changes in the Number of Licensed Optometrists January 1972 to January 1976

Regional Hospital District	1972	New Registrants[2]					Attr'n	Migr'n	Spec.	1976
		B.C.	O. Can.	Foreign	Activations	Total				
1 East Kootenay	4	0	1	0	0	1	0	0	0	5
2 Central Kootenay	5	0	0	1	0	1	1	0	0	5
2a Kootenay Boundary	3	0	0	0	0	0	0	0	0	3
3 Okanagan-Similkameen	3	0	1	0	0	1	0	0	0	4
4 Columbia-Shuswap	1	0	2	0	0	2	0	0	0	3
5 North Okanagan	2	0	0	0	0	0	1	1	0	2
6 Central Okanagan	3	0	1	0	0	1	0	0	0	4
7 Thompson-Nicola	7	0	3	0	0	3	0	0	0	10
8 Cariboo	2	0	0	1	0	1	0	0	0	3
9 Squamish-Lillooet	0	0	0	0	0	0	0	0	0	0
10 Fraser-Cheam	2	0	0	0	0	0	0	0	0	2
11 Central Fraser Valley	4	0	0	0	0	0	0	1	0	5
12 Dewdney-Alouette	2	0	0	0	0	0	1	1	0	2
13 Greater Vancouver	71	0	8	3	0	11	6	-3	0	73
14 Sunshine Coast	1	0	0	0	0	0	0	0	0	1
15 Powell River	1	0	0	0	0	0	0	0	0	1
16 Mount Waddington	0	0	0	0	0	0	0	0	0	0
16a Central Coast	0	0	0	0	0	0	0	0	0	0
17 Skeena-Queen Charlotte	2	0	0	0	0	0	1	0	0	1
18 Kitimat-Stikine	2	0	0	0	0	0	0	0	0	2
19 Bulkley-Nechako	0	0	0	0	0	0	0	0	0	0
20 Fraser-Fort George	5	0	1	0	0	1	0	-1	0	5
21 Peace River-Liard	3	0	2	0	0	2	0	-1	0	4
22 Stikine	0	0	0	0	0	0	0	0	0	0
23 Capital	15	0	0	0	0	0	0	2	0	17
24 Cowichan Valley	1	0	0	0	0	0	0	0	0	1
25 Nanaimo	2	0	1	0	0	1	0	0	0	3
26 Alberni-Clayoquot	3	0	0	0	0	0	0	0	0	3
27 Comox-Strathcona	3	0	0	0	0	0	0	0	0	3
TOTAL	147	0	20	5	0	25	10	0	0	162

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[2] Optometrists who were active in B.C. in 1976 but not in 1972.

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governed by the Optometry Act and its regulations.[1] This Act provides for the registration, examination, certification, and disciplining of duly qualified optometrists wishing to practice in the Province.

The British Columbia Optometric Association is the official professional society. Through a Board of Examiners defined in the Act, the Association also serves as the licensing and examining body.

The Optometry Act allows the Board of Examiners to make regulations respecting its members. These regulations outline the required training, expected mode of practice, professional conduct, and the means for disciplining persons registered under the Optometry Act. The Code of Ethics of the British Columbia Optometric Association is included in the Regulations, and thereby forms a part of the administration of the Optometry Act.

The Vision Care Task Force identified certain sections within the Optometry Act and its Regulations which affect the development of a coordinated vision care system. The pertinent sections are:-

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[1] The B.C. Optometric Association has urged that changes be made in this Act to provide for the separation of the examining, regulating and disciplining of the practice of Optometry from the political, economic and promotional activities of the profession; to include lay representation on the board; to make provision for the use of academic degrees and titles without reference to the Acts of other professional groups, and to make provision for the use of such drugs as might rightfully be necessary for the practice of optometry.

Section 9. (1) There shall be a Board of Examiners composed of not fewer than three and not more than five persons.

(2) The members of the Board shall be elected by the Council from among members of the Association in manner provided by this Act and in the by-laws of the Association

Section 10. (1) The Board may make regulations

a. prescribing the course of training and education for persons about to engage in the study of optometry and prescribing the qualifications of persons to be admitted to registration as optometrists;
b. providing for a course of instruction in optometry in the Province;
c. concerning the examination and admission of applicants to the study and practice of optometry;
d. concerning the practice of optometry;
e. concerning the government, discipline, and honour of those engaged in the practice of optometry;
f. fixing the fees payable by applicants for examination and for registration and for certificates of registration;
g. providing for the annual fees payable by members of the Association and fixing the penalties for non-payment thereof and for renewal of any certificate of registration and for any licence issued or to be issued by the Board;
h. prescribing the procedure of the Board at its meetings and for the hearing of any complaint that a person holding a certificate of registration or licence under this Act has been guilty of unprofessional conduct under, or of any violation of, the Act or regulations;
i. prescribing the duties of the secretary and staff of the Board;
j. regulating advertising by optometrists;
k. concerning the management and disposition of the moneys and funds coming to the hands of the Board;
l. generally for the better carrying-out of the provisions of this Act.

The Board of Examiners of the British Columbia Optometric Association has power over the conduct of members of the profession. Generally, the governing board and examining board of a profession are separate, but these two bodies are not separated under the Optometry Act.

The members of the Board of Examiners are elected by the Council from among members of the Association. Some Task Force discussion has taken place respecting the representation of appropriate professional groups on either the Council or Board of Examiners. The British Columbia Optometric Association is anxious to include lay representatives on its Board of Examiners, and has already made representation to the Minister of Health to change the Act accordingly.

The Regulations are explicit in preventing the optometrist from providing certain individuals with information regarding a prescription for contact lenses. This regulation essentially prevents the Optometrist from sharing his work with the Dispensing Opticians in the field of contact lens work. The Regulation reads:

> 34. A member shall be deemed to have been guilty of unprofessional conduct who becomes in breach of any of these regulations and without limiting the generality of the foregoing but for greater certainty a member shall be deemed to have been guilty of unprofessional conduct if he:...
>
> > e. Permits, allows or causes a person, who is not a registered Optometrist or Ophthalmologist, to use the said Optometrist's prescription or Optometric findings to fit contact lenses upon any person.

The definition of the scope of practice of Optometry is given in the Act, viz

> 16. Any one or any combination of the following practices constitutes the practice of optometry:--
>
> a. The investigation of the functions of the human eye by means of test-lenses, test-cards, trial-frames, and other instruments or devices designed for the purpose of such investigation;
>
> b. The prescription or adaptation of lenses, prisms, or the use of orthoptic instruments of any kind for the purpose of improving or correcting the visual function, or for adapting the visual function to the requirements of a special occupation. R.S. 1948, c.244, s.16

Section 16 of the Optometry Act of British Columbia may be interpreted so as to prohibit certain individuals from using instruments that are used in the "practice of optometry". This section of the Act suggests that a differentiation between diagnostic and measurement devices is needed, especially with respect to Dispensing Opticians, who are fitting contact lenses. There is considerable concern expressed by optometrists, and demonstrated by periodic injunctions against dispensing opticians, that some opticians may be practicing optometry.

Section 12 of the Optometry Act restricts registration of other-wise qualified optometrists on the basis of citizenship, viz:

> 12. Every person
>
> a. who is a British subject of the full age of twenty-one years; and
> b. who is entitled to be registered as a voter under the Provincial Elections Act; and
> c. who files with the Board a photograph of himself and also files an application verified by a statuatory declaration on forms prescribed by the regulations; and

> d. who satisfies the Board by documentary or other evidence (if required) proving the facts alleged in such application; and
> e. who passes the examinations prescribed by the Board; and
> f. who pays the prescribed fees
>
> is entitled to be registered by the Board as an optometrist and is entitled to receive from the Board a certificate of registration accordingly.

Section 34 of the Regulations under the Optometry Act prohibits optometrists from advertising their services or any appliances which they dispense.

> 34. A member shall be deemed to have been guilty of unprofessional conduct who becomes in breach of any of these regulations and without limiting the generality of the foregoing but for greater certainty a member shall be deemed to have been guilty of unprofessional conduct if he:...
>
> d. Displays any merchandise, ophthalmic material or advertising of any kind in windows or in any place open to the public's view where it could be deemed by the Board to be used primarily for the purpose of inducing patronage;...
>
> g. Advertises or represents the possession of a peculiar or particular technique which renders his Optometric practice superior or more effective than that of other Optometrists.

The legality of regulations of this sort has been questioned by Federal combines investigations, but no test case has been undertaken within the Province of British Columbia. These strict restrictions against advertising by optometrists and the open advertising carried out by certain dispensing opticians is a source of conflict between the two groups. Certainly the degree of competition in dispensing of spectacles or contact lenses is reduced by the current ethical limitations against advertising by the optometrists.

Section 10 of the Optometry Act stipulates that only the Board of Examiners may make regulations (or initiate changes in the regulations) under the Act. Therefore, this section gives the sole responsibility for initiating the modification of the practice of optometry under the Optometry Act to the Board of Examiners of the Association. The approval of the Lieutenant Governor-in-Council must be obtained before any modification of the practice of optometry becomes law. Changes in the Code of Ethics and other sections contained within the Regulations will therefore require either the full cooperation and participation of the Optometric Association or a change in the Act removing this power from the Board of Examiners.

d. Demographic Characteristics of Optometrists in British Columbia

The following tables outline the demographic characteristics of optometrists practicing in British Columbia.

Table 20 shows the number of MSC Active Optometrists in

Table 20 **Number of MSC Active Optometrists[1] and FTE[2] Optometrists**

by Regional Hospital District in British Columbia

for the year May 1975 to April 1976.

	Regional Hospital District	Number	Number per Population[3]	Number of FTE[2]	FTE[2] per Population[3]	Ratio FTE /Number
1	East Kootenay	5.	109.23	4.84	105.74	0.97
2	Central Kootenay	5.	104.38	3.87	80.76	0.77
2a	Kootenay Boundary	3.	95.86	3.45	110.23	1.15
3	Okanagan-Similkameen	4.	78.94	3.12	61.57	0.78
4	Columbia-Shuswap	3.	86.20	1.46	41.95	0.49
5	North Okanagan	3.	65.51	2.48	54.16	0.83
6	Central Okanagan	4.	57.87	3.36	48.61	0.84
7	Thompson-Nicola	9.	99.67	10.22	113.19	1.14
8	Cariboo	3.	59.21	2.84	56.05	0.95
9	Squamish-Lillooet	0.	0.0	0.0	0.0	0.0
10	Fraser-Cheam	2.	39.72	1.58	31.38	0.79
11	Central Fraser Valley	3.	35.01	2.62	30.57	0.87
12	Dewdney-Alouette	2.	39.32	2.62	51.51	1.31
	Greater Vancouver	76.	71.91	62.11	58.77	0.82
	Sunshine Coast	1.	81.65	1.22	99.61	1.22
15	Powell River	1.	51.49	0.70	36.04	0.70
16	Mount Waddington	0.	0.0	0.0	0.0	0.0
16a	Central Coast	0.	0.0	0.0	0.0	0.0
17	Skeena-Queen Charlotte	2.	91.25	1.37	62.51	0.68
18	Kitimat-Stikine	2.	52.50	2.96	77.69	1.48
19	Bulkley-Nechako	0.	0.0	0.0	0.0	0.0
20	Fraser-Fort George	5.	64.38	7.91	101.85	1.58
21	Peace River-Liard	4.	91.24	3.45	78.69	0.86
22	Stikine	0.	0.0	0.0	0.0	0.0
23	Capital	15.	66.80	12.36	55.04	0.82
	Cowichan Valley	1.	22.15	0.94	20.83	0.94
	Nanaimo	4.	65.82	3.58	58.91	0.89
26	Alberni-Clayoquot	3.	94.53	2.02	63.65	0.67
27	Comox-Strathcona	3.	53.80	2.86	51.29	0.95
	TOTAL	163.	67.74	143.94	59.82	0.88

[1] Optometrists billing to MSC.

[2] Full Time Equivalents.

[3] Population Estimates obtained from, Population: Preliminary Counts, Statistics Canada. (1976 Census) Number is per 1,000,000 Population.

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B.C.[1], by Regional Hospital District, along with the full-time equivalent estimates (FTE).[2] The data indicate a large variation in regional optometric manpower supply. The inclusion of satellite practices[3] in the calculation tends to moderate the variation to some extent, but a significant and troublesome variation still exists.

In Table 21, the adjusted FTEs are presented as ratios to the population, and as ratios to the adjusted number of optometrists in each regional district. It will be observed that the ratios to population vary from a low of 0.0 per million population (in Stikine) to 124.10 per million population (in Sunshine Coast). The ratio of FTE to the number of optometrists is a measure of the "busyness" of optometrists: a figure above 1.00 means that the optometrists are more productive than the provincial average in that particular regional district. This could be interpreted to mean that they are in short supply, relative to the demand for their services. "Busy" regions appear

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[1] MSC Active Optometrists are those with a valid and active billing number on the tapes of the Medical Services Plan of B.C. (May 75 to April 76); it thus records those who are likely to be "in practice", though it does not adjust for the size of practice as is done by the calculation of FTE.

[2] See Appendix II for a description of the method of calculation of full-time equivalents (FTE).

[3] A survey conducted by the B.C.Optometric Association provided information on all satellite practices, including the number of days per month each optometrist was located at an office outside his customary regional hospital district. This information was used to adjust the number of MSC Active and FTE optometrists in Table 20 to create Table 21.

Table 21 Number of MSC Active Optometrists[1] and FTE[2] Optometrists adjusted for satellite practices by Regional Hospital District in British Columbia

for the year May 1975 to April 1976.

Regional Hospital District		Adjusted[4] Number	Number per Population[3]	Number of FTE[2]	FTE[2] per Population[3]	Ratio FTE /Number
1	East Kootenay	5.00	109.23	4.84	105.74	0.97
2	Central Kootenay	4.77	99.54	3.64	75.96	0.76
2a	Kootenay Boundary	3.23	103.20	3.68	117.58	1.14
3	Okanagan-Similkameen	4.10	80.91	3.22	63.54	0.79
4	Columbia-Shuswap	3.00	86.20	1.46	41.95	0.49
5	North Okanagan	3.24	70.75	2.72	59.40	0.84
6	Central Okanagan	3.76	54.40	3.12	45.14	0.83
7	Thompson-Nicola	9.00	99.67	10.22	113.19	1.14
8	Cariboo	3.21	63.35	3.05	60.20	0.95
9	Squamish-Lillooet	0.34	21.98	0.34	21.98	1.00
10	Fraser-Cheam	2.00	39.72	1.58	31.38	0.79
11	Central Fraser Valley	3.00	35.01	2.62	30.57	0.87
12	Dewdney-Alouette	1.62	31.85	2.24	44.04	1.38
13	Greater Vancouver	75.59	71.52	61.70	58.38	0.82
14	Sunshine Coast	1.30	106.14	1.52	124.10	1.17
15	Powell River	1.00	51.49	0.70	36.04	0.70
16	Mount Waddington	0.27	21.94	0.27	21.94	1.00
16a	Central Coast	0.04	9.68	0.05	12.10	1.25
17	Skeena-Queen Charlotte	2.32	105.85	1.69	77.11	0.73
18	Kitimat-Stikine	1.68	44.10	2.64	69.29	1.57
19	Bulkley-Nechako	0.99	31.47	0.99	31.47	1.00
20	Fraser-Fort George	3.80	48.93	6.70	86.27	1.76
21	Peace River-Liard	4.00	91.24	3.45	78.69	0.86
22	Stikine	0.0	0.0	0.0	0.0	0.0
23	Capital	14.74	65.64	12.10	53.88	0.82
24	Cowichan Valley	1.00	22.15	0.94	20.83	0.94
25	Nanaimo	4.00	65.82	3.58	58.91	0.89
26	Alberni-Clayoquot	3.00	94.53	2.02	63.65	0.67
27	Comox-Strathcona	3.00	53.80	2.86	51.29	0.95
	TOTAL	163.00	67.74	143.94	59.87	0.88

[1] Optometrists billing to MSC.

[2] Full Time Equivalents.

Population Estimates obtained from, Population: Preliminary Counts, Statistics Canada. (1976 Census) Number is per 1,000,000 Population.

[4] Adjusted to account for time Optometrist spends in region (proportion of week etc.)

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to be Fraser-Fort George (1.76), Kitimat-Stikine (1.57), Central Coast (1.25); conversely, regions that do not appear to be excessively "busy" are Columbia-Shuswap (0.49), Alberni-Clayoquot (0.67) and Central Kootenay (0.76).

Nearly 63% of the optometrists in British Columbia are Canadian graduates. In Greater Vancouver Regional Hospital District, nearly 57% of the practitioners are Canadian graduates, whereas only 41% of the optometrists in Victoria are in this category. In the non-Metropolitan areas, this figure approaches 74%. Overall, 32.5% of all registered optometrists, at September 1975, graduated from the United States (Table 22).

In Table 23 is shown the age distribution of optometrists by Regional Hospital District. The total provincial statistics by age are shown for 1976 in Fig.5, where the cumulative distribution of optometrists has been plotted by age. The median age of the current B.C. optometrist is 52 years. It is noted, however, from Table 23 that a majority of the practitioners in the Metropolitan areas are in the older age categories. This may suggest that younger new Canadian graduates are choosing to practice in non-Metropolitan areas. With time, immigration restrictions now being proposed by the Federal Government may tend to reduce the proportion of graduates practicing in B.C. who are British subjects.

Table 5 illustrates both optometric and ophthalmologic manpower trends through the years 1956 to 1976. There has been a slow increase in optometric manpower over this time period, which in fact has caused a significant decrease in the number of

Table 22: Number and Percent Distribution of Optometrists[1] in British Columbia by Place of Graduation by Regional Hospital District as at September 1975

Place of Graduation	Regional Hospital District						Total	
	Greater Vancouver		Capital		Other B.C.			
	Number	Percent[2]	Number	Percent[2]	Number	Percent[2]	Number	Percent[2]
Ontario	45	56.96	7	41.18	52	74.29	104	62.65
United States	29	36.71	9	52.94	16	22.86	54	32.53
United Kingdom	1	1.27	1	5.88	0	0.00	2	1.20
Unknown	4	5.06	0	0.00	2	2.86	6	3.61
TOTAL	79	100.00	17	100.00	70	100.00	166	100.00

[1] Definitions are as in the attached text.

[2] Percentages may not add due to rounding.

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Table 23: Number of Licensed Optometrists by Age
as at January 1976

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	3	1	1	0	0	0	0	5
2	Central Kootenay	0	1	1	1	2	0	0	0	5
2a	Kootenay Boundary	0	1	0	0	2	0	0	0	3
3	Okanagan-Similkameen	0	1	0	1	2	0	0	0	4
4	Columbia-Shuswap	0	2	0	0	1	0	0	0	3
5	North Okanagan	0	0	0	1	0	0	0	1	2
6	Central Okanagan	0	1	0	1	1	0	0	1	4
7	Thompson-Nicola	0	5	1	2	1	1	0	0	10
8	Cariboo	0	0	1	2	0	0	0	0	3
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	1	1	0	0	0	2
11	Central Fraser Valley	0	0	1	1	2	0	0	1	5
12	Dewdney-Alouette	0	0	1	1	0	0	0	0	2
13	Greater Vancouver	1	10	12	15	24	1	2	8	73
14	Sunshine Coast	0	0	0	0	0	0	0	1	1
15	Powell River	0	0	0	1	0	0	0	0	1
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls*	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	1	0	0	0	1
18	Kitimat-Stikine	0	1	0	0	1	0	0	0	2
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	2	0	2	1	0	0	0	5
21	Peace River-Liard	1	1	2	0	0	0	0	0	4
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	2	6	7	0	0	2	17
24	Cowichan Valley	0	0	0	0	0	1	0	0	1
25	Nanaimo	0	1	0	0	2	0	0	0	3
26	Alberni-Clayoquot	0	0	1	0	1	0	1	0	3
27	Comox-Strathcona	0	0	1	2	0	0	0	0	3
Total		2	29	24	38	49	3	3	14	162

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* Now called Central Coast

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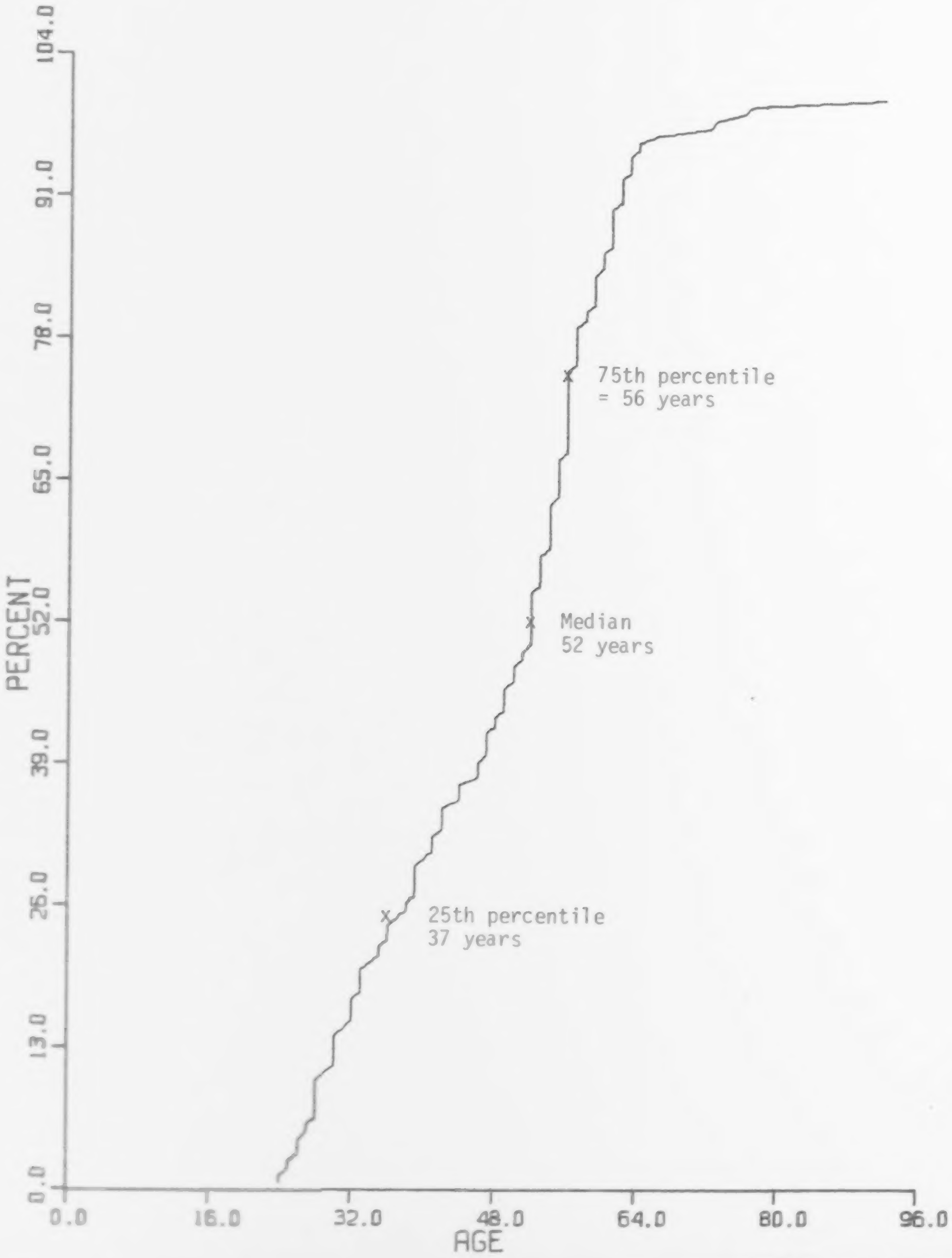
FIGURE 5



OPTOMETRISTS BY AGE

1976

optometrists per population, although the last three years show increases which reverse this overall trend. In recent years, larger increases in both manpower groups have been seen. This growth has been plotted in Fig. 6. Since 1956, the growth of ophthalmologic manpower has been at a proportionally greater rate. The more recent trend over the period 1972 to 1976 indicates, however, that currently the numbers of optometric manpower are increasing at a greater rate than that for ophthalmology. Therefore, the Task Force is not prepared at this time to draw any conclusions regarding these trends for the future.

The regional age distribution of Optometrists in 1972 in British Columbia was as shown in Table 24; this can be compared with the distribution for 1976 shown in Table 23. There appears to have been a relatively stable population in the older age groups of optometrists, and most increases have occurred in the younger cohorts. Table 19 demonstrates the changes in optometric manpower that have occurred between 1972 to 1976. Only one region has lost a practitioner without replacement (Skeena-Queen Charlotte). The largest net increase, five out of a total of fifteen over five years, was found to be in Greater Vancouver. Table 25 indicates the number of optometrists involved in the process of attrition by age group, from 1972 to 1976.

In Table 26 is presented the age distributions of the newly recruited optometric stock during the time period 1972 to 1976. Nearly 80% of the new licencees are in the first two age groups. This trend is seen for the optometrists who graduated from

FIGURE 6

NUMBER OF OPHTHALMOLOGISTS & OPTOMETRISTS

1956 - 1976

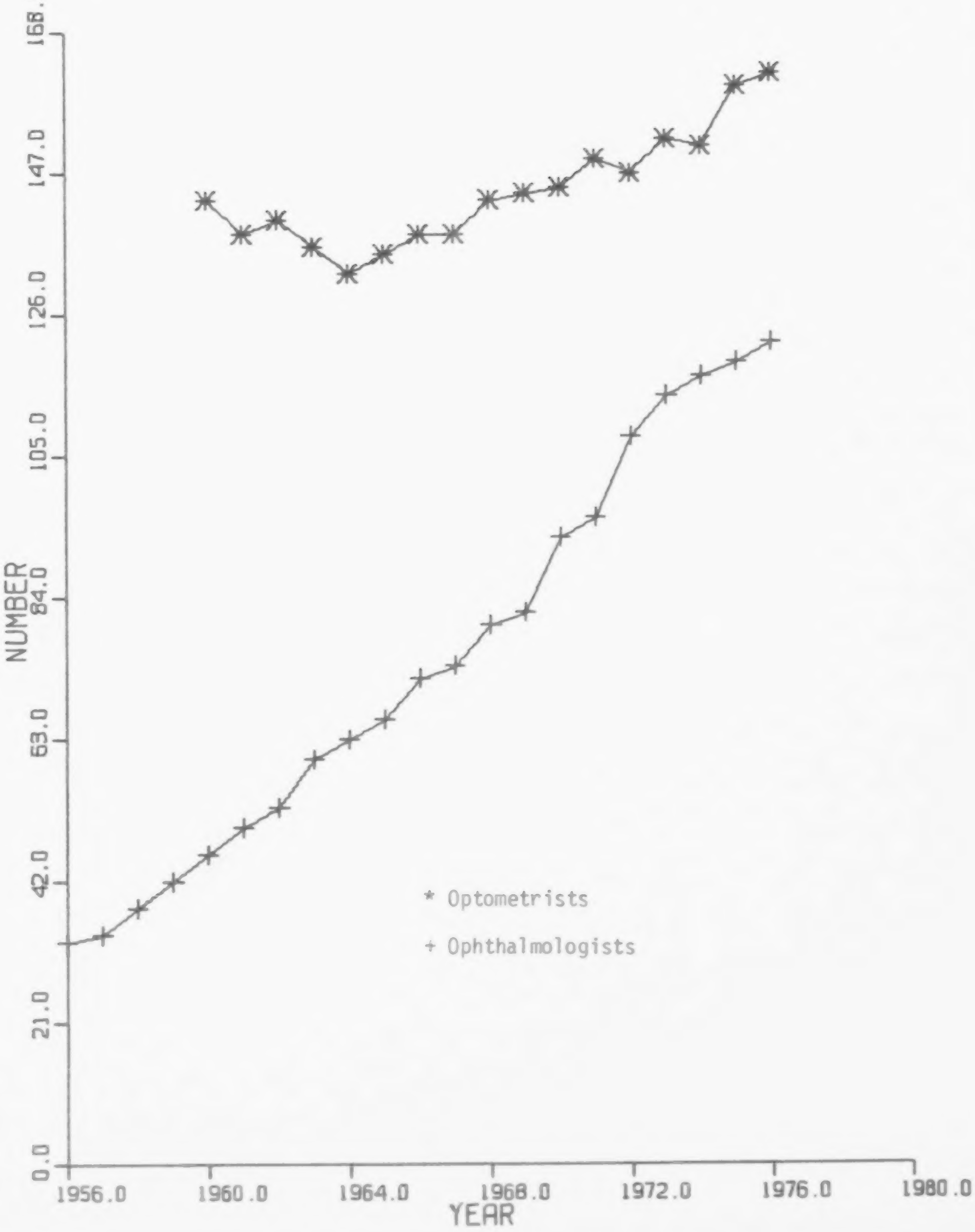


Table 24: Number of Licensed Optometrists by age
as at January 1972

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	2	1	1	0	0	0	0	4
2	Central Kootenay	0	0	1	1	2	0	0	1	5
2a	Kootenay Boundary	0	1	0	0	2	0	0	0	3
3	Okanagan-Similkameen	0	0	0	1	2	0	0	0	3
4	Columbia-Shuswap	0	0	0	0	1	0	0	0	1
5	North Okanagan	0	0	0	0	0	0	0	2	2
6	Central Okanagan	0	0	0	1	1	0	0	1	3
7	Thompson-Nicola	0	2	1	2	1	1	0	0	7
8	Cariboo	0	0	1	1	0	0	0	0	2
9	Squamish-Lillooet*	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	1	1	0	0	0	2
11	Central Fraser Valley	0	0	0	1	2	0	0	1	4
12	Dewdney-Alouette	0	0	1	0	1	0	0	0	2
13	Greater Vancouver	0	3	12	17	24	1	1	13	71
14	Sunshine Coast	0	0	0	0	0	0	0	1	1
15	Powell River	0	0	0	1	0	0	0	0	1
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls*	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	1	0	0	1	2
18	Kitimat-Stikine	0	1	0	0	1	0	0	0	2
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	1	0	2	1	0	1	0	5
21	Peace River-Liard	0	0	2	0	0	0	0	1	3
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	2	6	7	0	0	0	15
24	Cowichan Valley	0	0	0	0	0	1	0	0	1
25	Nanaimo	0	0	0	0	2	0	0	0	2
26	Alberni-Clayoquot	0	0	1	0	1	0	1	0	3
27	Comox-Strathcona	0	0	1	2	0	0	0	0	3
Total		0	10	23	37	50	3	3	21	147

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* Now called Central Coast

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Table 25: Number of Attritions from Licensed Optometrists
from January 1972 to January 1976

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
	East Kootenay	0	0	0	0	0	0	0	0	0
	Central Kootenay	0	0	0	0	0	0	0	0	0
2a	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	0	0	0	0	0	0	0	0
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	0	0	0	0	0	0	0	0
6	Central Okanagan	0	0	0	1	0	0	0	0	1
7	Thompson-Nicola	0	0	0	0	0	0	0	0	0
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	0	0	0	0	0	0
11	Central Fraser Valley	0	0	0	0	0	0	0	0	0
	Dewdney-Alouette	0	0	0	0	1	0	0	0	1
	Greater Vancouver	0	2	0	0	2	1	1	0	6
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls*	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	1	0	0	0	0	0	0	1
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	0	0	0	0	0	0	0
21	Peace River-Liard	0	0	0	1	0	0	0	0	1
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	0	0	0	0	0	0	0
	Cowichan Valley	0	0	0	0	0	0	0	0	0
	Nanaimo	0	0	0	0	0	0	0	0	0
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		0	3	0	2	3	1	1	0	10

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[*] Now called Central Coast

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The Table as shown above, is a modification of the original Table printed from MSC information.
The modifications are a result of information provided by the British Columbia Optometric Association.

Table 26: Immigration and Registration of Licenced Optometrists
from January 1972 to January 1976

All Schools of Graduation

Total

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	1	0	0	0	0	0	0	1
2	Central Kootenay	0	1	0	0	0	0	0	0	1
2a	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	1	0	0	0	0	0	0	1
4	Columbia-Shuswap	0	2	0	0	0	0	0	0	2
5	North Okanagan	0	0	0	0	0	0	0	0	0
6	Central Okanagan	0	1	0	0	0	0	0	0	1
7	Thompson-Nicola	0	3	0	0	0	0	0	0	3
8	Cariboo	0	0	0	1	0	0	0	0	1
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	0	0	0	0	0	0
11	Central Fraser Valley	0	0	0	0	0	0	0	0	0
12	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
13	Greater Vancouver	1	7	1	0	1	0	0	1	11
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls*	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	1	0	0	0	0	0	0	1
21	Peace River-Liard	1	1	0	0	0	0	0	0	2
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	0	0	0	0	0	0	0
24	Cowichan Valley	0	0	0	0	0	0	0	0	0
25	Nanaimo	0	1	0	0	0	0	0	0	1
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		2	19	1	1	1	0	0	1	25

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* Now called Central Coast

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Waterloo (Table 27). The small number of newly recruited optometrists which graduated from foreign schools is seen in Table 28.

e. Workload of Optometrists

Optometrists provide a number of services which include the vision examination, contact lens therapy, orthoptics and visual training, and low vision services. In British Columbia, the vision examination, and parts thereof, are the only services that may be charged to the Medical Services Plan. These services are outlined below: (BCOA ,1975)

> Fee Code 2899, Refraction (Major Visual Examination). This includes all necessary diagnostic procedures to determine the refractive, muscular, sensory and physical condition of the eyes and visual performance, as well as an examination to detect disease processes affecting the eye and making the necessary diagnosis and prescription.
>
> Fee Code 2898, Re-Examination (Minor Examination). This is generally, but not necessarily a follow-up to a prior major examination to establish or confirm the diagnosis or to observe further changes in the patient's condition.
>
> Fee Code 2897, Tonometry This is a measure of the intra-ocular pressure. This fee is to cover tonometry when performed in isolation. It is always performed during a more extensive examination and is included in that fee.

The following tables outline the workload performed by optometrists practicing in British Columbia and for which they have billed the Medical Services Plan. Workload estimates are

Table 27: Immigration and Registration of Licensed Optometrists
from January 1972 to January 1976

GRADUATION: from Canadian Schools

Total

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	1	0	0	0	0	0	0	1
2	Central Kootenay	0	0	0	0	0	0	0	0	0
2a	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	1	0	0	0	0	0	0	1
4	Columbia-Shuswap	0	2	0	0	0	0	0	0	2
5	North Okanagan	0	0	0	0	0	0	0	0	0
6	Central Okanagan	0	1	0	0	0	0	0	0	1
7	Thompson-Nicola	0	3	0	0	0	0	0	0	3
8	Cariboo	0	0	0	0	0	0	0	0	0
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
10	Fraser-Cheam	0	0	0	0	0	0	0	0	0
11	Central Fraser Valley	0	0	0	0	0	0	0	0	0
12	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
13	Greater Vancouver	1	5	0	0	1	0	0	1	8
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls*	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	1	0	0	0	0	0	0	1
21	Peace River-Liard	1	1	0	0	0	0	0	0	2
22	Stikine	0	0	0	0	0	0	0	0	0
23	Capital	0	0	0	0	0	0	0	0	0
24	Cowichan Valley	0	0	0	0	0	0	0	0	0
25	Nanaimo	0	1	0	0	0	0	0	0	1
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		2	16	0	0	1	0	0	1	20

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[*] Now called Central Coast

Table 28: Immigration and Registration of Licensed Optometrists from January 1972 to January 1976

GRADUATION: from Foreign Schools

Total

	Region	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years	Unknown	Total
1	East Kootenay	0	0	0	0	0	0	0	0	0
2	Central Kootenay	0	1	0	0	0	0	0	0	1
2a	Kootenay Boundary	0	0	0	0	0	0	0	0	0
3	Okanagan-Similkameen	0	0	0	0	0	0	0	0	0
4	Columbia-Shuswap	0	0	0	0	0	0	0	0	0
5	North Okanagan	0	0	0	0	0	0	0	0	0
6	Central Okanagan	0	0	0	0	0	0	0	0	0
7	Thompson-Nicola	0	0	0	0	0	0	0	0	0
8	Cariboo	0	0	0	1	0	0	0	0	1
9	Squamish-Lillooet	0	0	0	0	0	0	0	0	0
	Fraser-Cheam	0	0	0	0	0	0	0	0	0
	Central Fraser Valley	0	0	0	0	0	0	0	0	0
12	Dewdney-Alouette	0	0	0	0	0	0	0	0	0
13	Greater Vancouver	0	2	1	0	0	0	0	0	3
14	Sunshine Coast	0	0	0	0	0	0	0	0	0
15	Powell River	0	0	0	0	0	0	0	0	0
16	Mount Waddington	0	0	0	0	0	0	0	0	0
16a	Ocean Falls*	0	0	0	0	0	0	0	0	0
17	Skeena-Queen Charlotte	0	0	0	0	0	0	0	0	0
18	Kitimat-Stikine	0	0	0	0	0	0	0	0	0
19	Bulkley-Nechako	0	0	0	0	0	0	0	0	0
20	Fraser-Fort George	0	0	0	0	0	0	0	0	0
21	Peace River-Liard	0	0	0	0	0	0	0	0	0
	Stikine	0	0	0	0	0	0	0	0	0
	Capital	0	0	0	0	0	0	0	0	0
24	Cowichan Valley	0	0	0	0	0	0	0	0	0
25	Nanaimo	0	0	0	0	0	0	0	0	0
26	Alberni-Clayoquot	0	0	0	0	0	0	0	0	0
27	Comox-Strathcona	0	0	0	0	0	0	0	0	0
Total		0	3	1	1	0	0	0	0	5

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* Now called Central Coast

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difficult to establish in the area of contact lens therapy and other non-insured services.

Table 13 shows the number of services performed both by ophthalmologists and optometrists through the years 1970 to 1976. A slow increase in the number of optometric vision examinations can be noted through the years 1970 to 1973; the removal of refraction restrictions in 1974 was associated with a moderate increase in the number of vision examinations provided. This growth has continued in recent years. Substantial increases in the number of minor examinations and tonometric services can be noted as well. Fig. 7 and Fig. 8 illustrate these trends graphically on arithmetic (Fig. 7) and logarithmic (Fig. 8) scales.[1] The trends for tonometric services provided by ophthalmologists and optometrists are presented in Fig. 9 and Fig. 10. These trend lines indicate that optometrists are increasing faster than ophthalmologists in billing for tonometry since 1973: their rate of increase for refractive services is about the same since the same date.

Table 14 shows the mean number of refractions (or visual examinations) performed per optometrist and ophthalmologist through the years 1970 to 1976. The current productivity rate of 1349 examinations per year for optometrists has caused comment

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[1] The logarithmic scale (to the base 10) permits the direct comparison of two trend lines over time; if the rate of increase is identical, two trend lines will have the same slope, i.e., rise at the same rate when the logarithms are plotted.

FIGURE 7

REFRACTION SERVICES

1970 - 1976

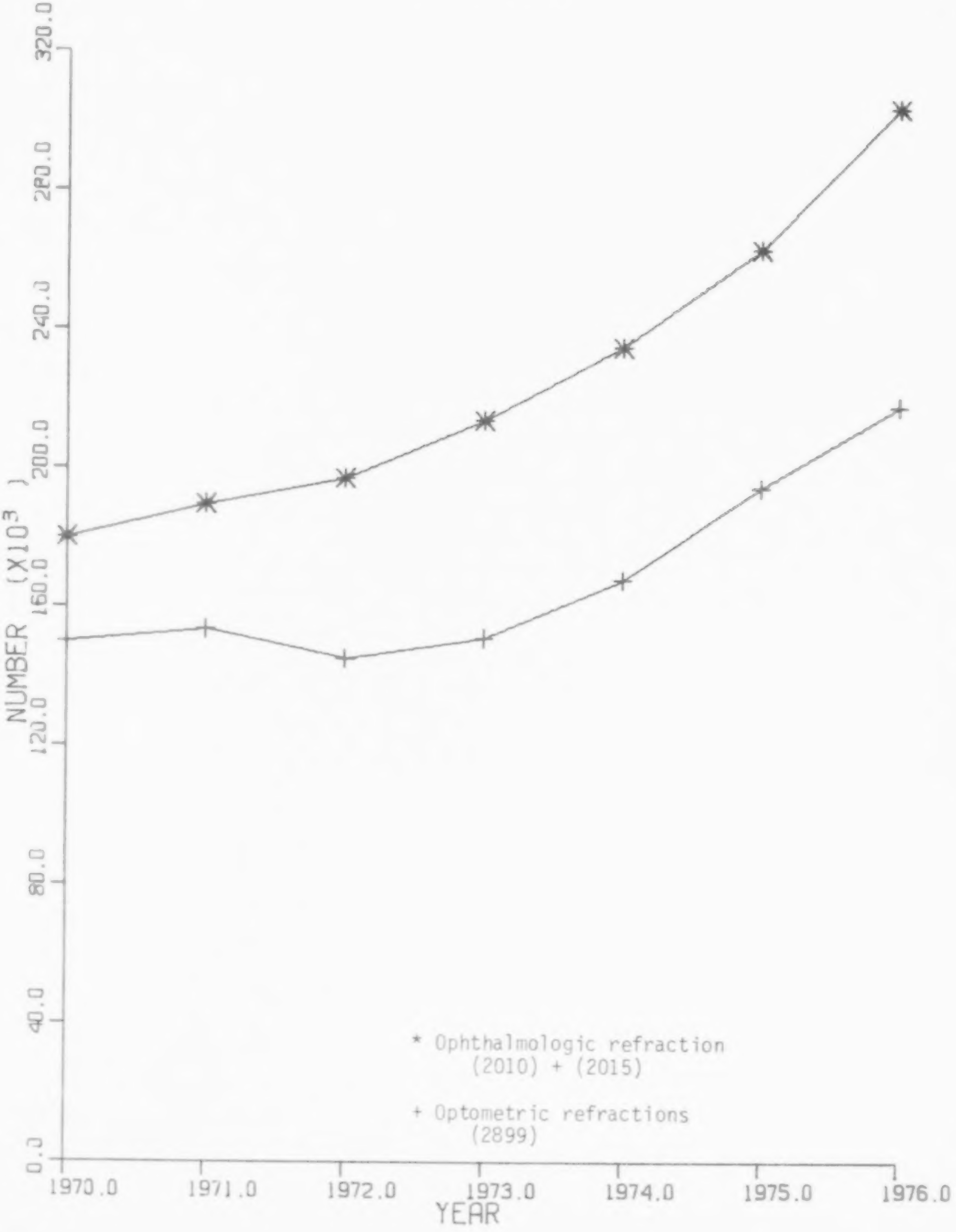


FIGURE 8

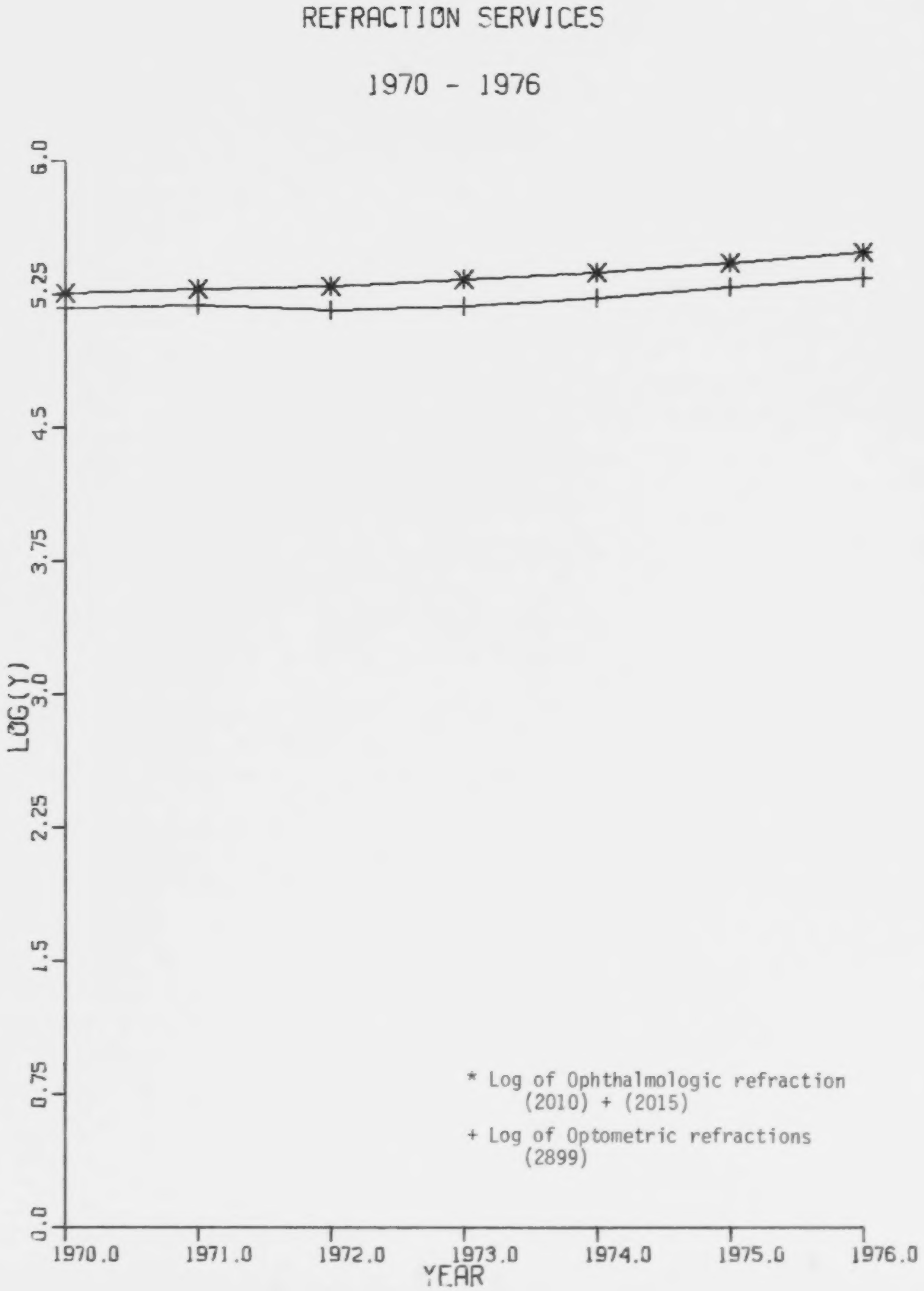

REFRACTION SERVICES
1970 - 1976
LOG(Y)
0.0
0.75
1.5
2.25
3.0
3.75
4.5
5.25
6.0
YEAR
1970.0
1971.0
1972.0
1973.0
1974.0
1975.0
1976.0
* Log of Ophthalmologic refraction (2010) + (2015)
+ Log of Optometric refractions (2899)

FIGURE 9

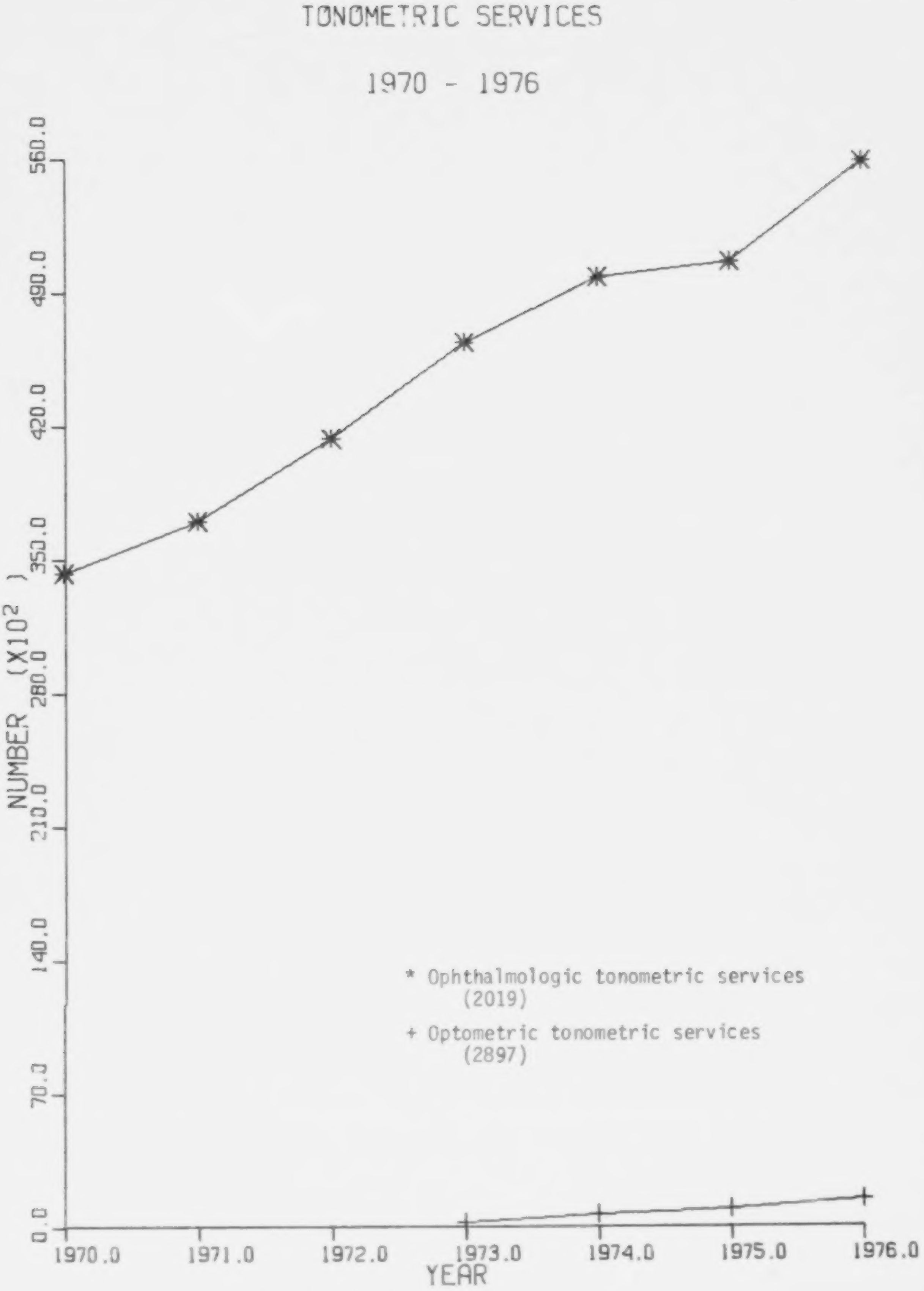
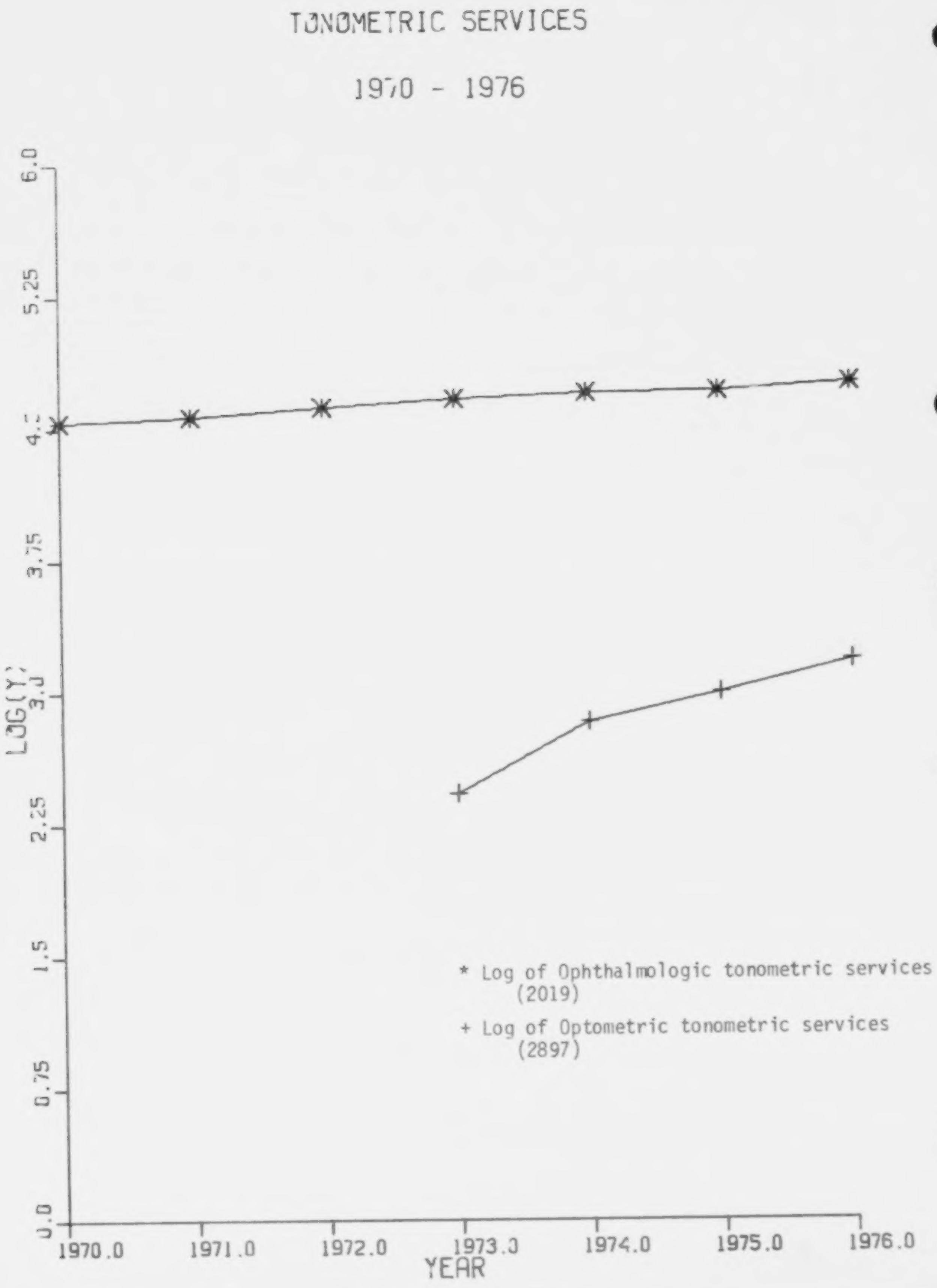

TONOMETRIC SERVICES
1970 - 1976
NUMBER (X10²)
560.0
490.0
420.0
350.0
280.0
210.0
140.0
70.0
0.0
1970.0
1971.0
1972.0
1973.0
1974.0
1975.0
1976.0
YEAR
* Ophthalmologic tonometric services (2019)
+ Optometric tonometric services (2897)

FIGURE 10


TONOMETRIC SERVICES
1970 - 1976
LOG(Y)
6.0
5.25
4.5
3.75
3.0
2.25
1.5
0.75
0.0
1970.0
1971.0
1972.0
1973.0
1974.0
1975.0
1976.0
YEAR
* Log of Ophthalmologic tonometric services (2019)
+ Log of Optometric tonometric services (2897)

(e.g., Shillington and Anderson, 1974), but is explained in part by a denominator which is comprised of all registered optometrists regardless of their professional activity, and in part by the fact that a refractive service to an optometrist is different from that to an ophthalmologist, and therefore this table to some extent compares the non-comparable. Nevertheless these data are plotted in Fig. 11 and Fig. 12 in arithmetic and logarithmic units respectively. It will be seen that the productivity increase for optometrists is virtually identical to that for ophthalmologists.

5. THE DISPENSING OPTICIAN

a. Definition and Role

A Dispensing Optician is a person who specializes in the fabrication and dispensing of eye wear (DOABC, 1977), who currently, in this province, may or may not have received formal training through the Canadian Guild of Dispensing Opticians.

The Dispensing Optician advises patients on the type of frame and lenses most suitable to their occupation or interests, accurately interprets the Ophthalmologist's or Optometrist's prescription, insures that eye wear is fabricated correctly to that prescription, accurately checks the completed work, and correctly fits the patient with his or her new vision care product, while at the same time advising the patient of the correct use of any advanced lens type (DOABC, 1977).

FIGURE 11

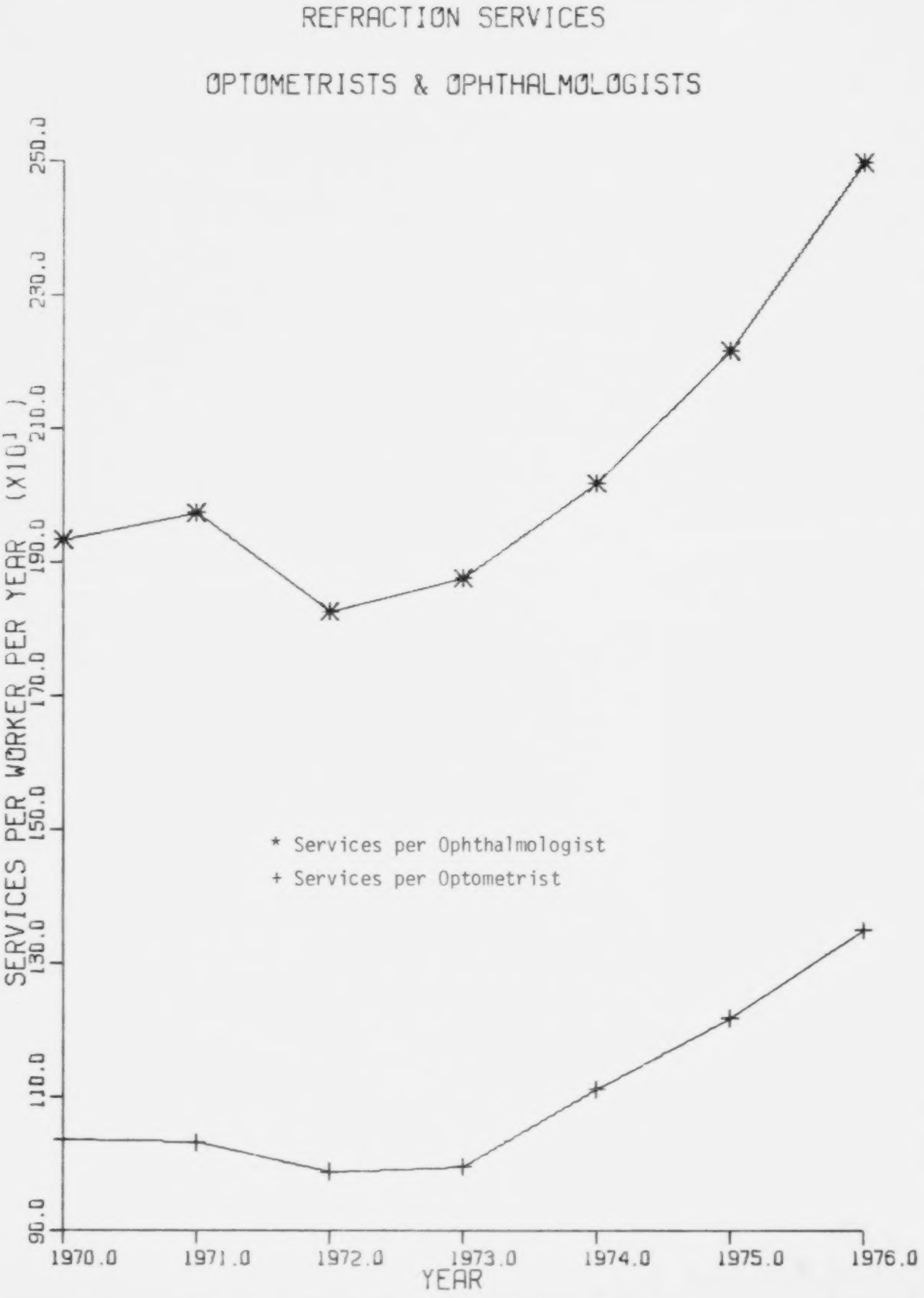
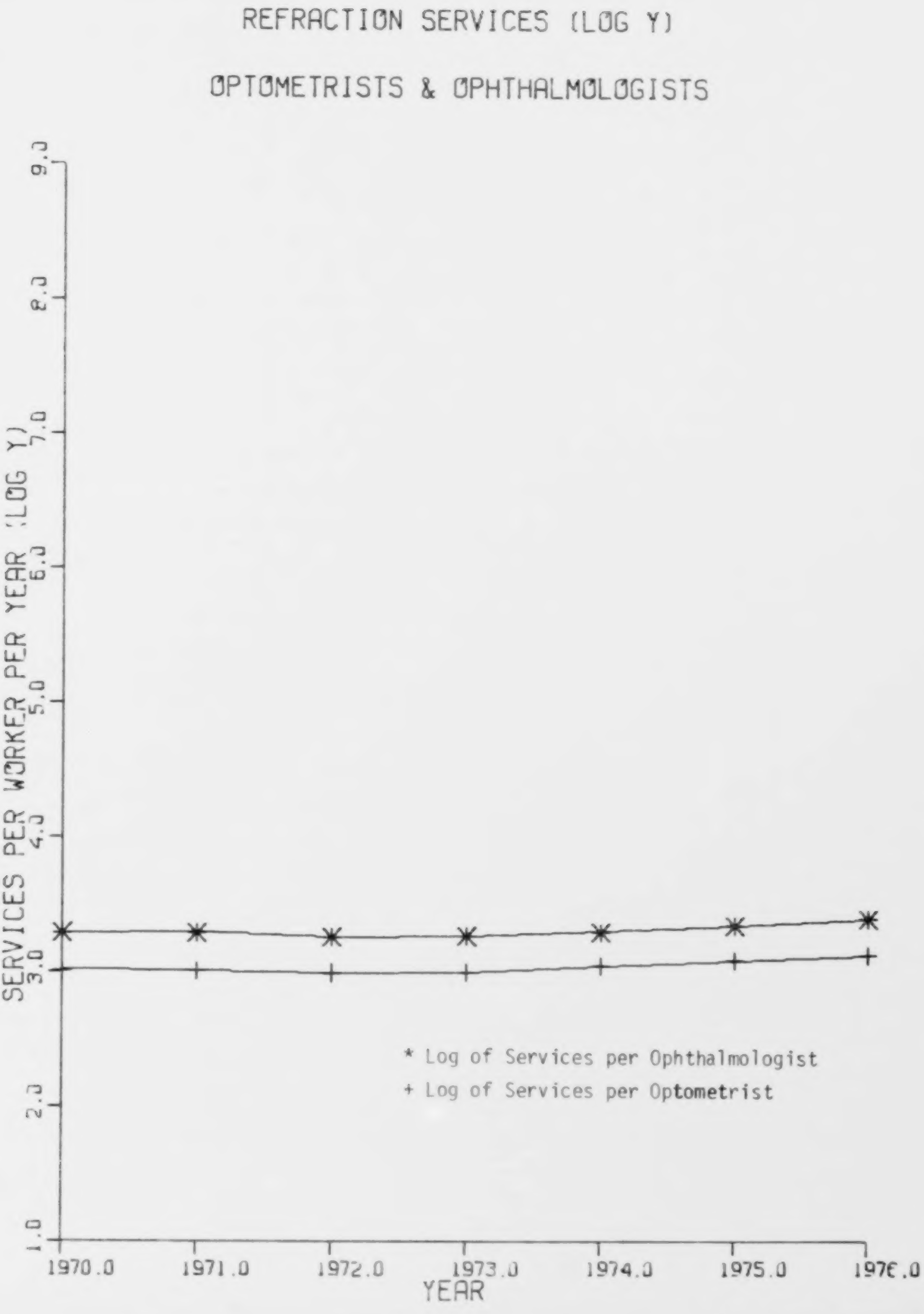

REFRACTION SERVICES
OPTOMETRISTS & OPHTHALMOLOGISTS
SERVICES PER WORKER PER YEAR (X10^{1})
250.0
230.0
210.0
190.0
170.0
150.0
130.0
110.0
90.0
* Services per Ophthalmologist
+ Services per Optometrist
1970.0
1971.0
1972.0
1973.0
1974.0
1975.0
1976.0
YEAR

FIGURE 12


REFRACTION SERVICES (LOG Y)
OPTOMETRISTS & OPHTHALMOLOGISTS
SERVICES PER WORKER PER YEAR (LOG Y)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
1970.0
1971.0
1972.0
1973.0
1974.0
1975.0
1976.0
YEAR
* Log of Services per Ophthalmologist
+ Log of Services per Optometrist

The dispensing optician works to a large extent within the medical-ophthalmic system. It is within this system that the dispensing optician is involved with the fitting of contact lenses. He does, however, service individuals directly, without reference to a prescriber, who wish to change their spectacle frames without a change in lenses.

In the United States, the Guild of Prescription Opticians of America was founded in 1925 with a stated purpose to "educate the public on the benefits of medical eye care". This was carried out through an educational programme during the period 1937 to 1946 (Miller, 1977). Citing this relationship, the Opticians Association of America (Miller, 1977) has summarized: the role of opticianry as:

> It does, however, demonstrate the role played by organized opticianry in the development of ophthalmology and its acceptance by the public. It also shows that organized dispensing opticianry has been built upon a close cooperation with ophthalmology and upon the need to provide patients with glasses that accurately meet both the requirements of the prescription and the visual needs of the patient.

b. Training of Dispensing Opticians

In B.C., the training of dispensing opticians begins in established dispensaries under experienced opticians who teach all phases of the practical application of optical knowledge with respect to lenses and frames. After six months of initial experience, the new trainee has the opportunity to enroll in the Canadian Guild of Dispensing Opticians' correspondence course, which is offered by the Dispensing Opticians Association of

British Columbia. This is a two year course which covers information felt to be necessary in the dispensing of ophthalmic appliances. The Association also provides instructional study sessions, and each year after the trainee has completed the required course papers, a closed book examination is written by the candidate.

Dispensing opticians who wish to do so may take a contact lens home study course, sponsored by the Dispensing Opticians Association of British Columbia. Examination procedures similar to those described above are also used for this course.

At the present time, all Dispensing Opticians Associations except those in Ontario and Quebec use the Canadian Guild Courses as a licensing vehicle, although the courses now used in Ontario parallel and were derived from Canadian Guild Courses. These courses were originally developed by Eric Rowe, with assistance from the Imperial Optical Co. Presently all student papers and examinations are marked by the Guild in Toronto without any reference to name or business affiliation of individuals. Each student is assigned a number and this is known only to Provincial Association education chairmen and registrars. All course papers are sent to the respective provincial registrars, who forward them to Toronto for marking. They are then returned to them for forwarding to the students.

Both the Dispensing Home Study Course and the Contact Lens Home Study Course are two year courses and cost the student $200 and $175 respectively, each year. At the end of each year, a written examination is given and a 50% pass mark is required.[1]

c. Legislation and Regulations governing the practice of opticianry

Dispensing Opticians are not licensed or regulated under any Act in British Columbia. This has been a matter of great concern to all professional members of the Vision Care system. Discussions regarding an Act governing opticianry have already taken place between the Dispensing Opticians Association of British Columbia, the staff in the Ministry of Health and the Attorney General's Department. Recently (June 1975) the Dispensing Opticians Association of B.C. has prepared draft legislation and regulations which have not as yet been acted upon by the provincial government, pending the report from the Task Force.

Dispensing Opticians may join the Association if they so wish, but membership in the Association is completely voluntary.

There is wide-spread agreement that an Act regulating the practice of Dispensing Opticians is required in order to protect the public from certain practices which are not safe or ethical, and from receiving care from inadequately trained personnel.

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[1] On March 22, 1977, Manpower Training Branch certified the Canadian Guild of Dispensing Opticians as an educational institution for purposes of the Income Tax Act. This enables students to deduct tuition fees as an expense from their income tax.

Legislation at this time is before the Saskatchewan Legislative Assembly (Bill 70) respecting Ophthalmic Dispensing. This proposed act was reviewed by the Vision Care Task Force who noted that all dispensing opticians (called ophthalmic dispensers in Saskatchewan) would be required to register after taking an examination set by a Board of Examiners. Further, opticians who could not pass the examination would, after a reasonable time, not be licensed and thus be barred from practice. This particular feature of the Saskatchewan Act eliminates what is commonly referred to as a "Grandfather Clause". It is noted that only such a technique will prevent those individuals, who are currently practicing as dispensing opticians without proper training, from being registered on the basis of their experience.

There are other features of the Saskatchewan Act which are of interest. The Act will also register "contact lens technicians", ophthalmic dispensers who pass an additional examination and possess "adequate training and experience in contact lens technique". The Board of Examiners contains an ophthalmologist and a non-dispensing optometrist. Because the passage of the Bill will immediately create the need for some board to govern the organization before any persons have been examined, the Act establishes a "Transitional Governing Board" of seven, appointed by the Lieutenant Governor-in-Council to conduct the affairs of the Saskatchewan Ophthalmic Dispensers' Association, successor to the Saskatchewan Guild of Ophthalmic Dispensers, which will transfer its power to an elected Council "when the Minister is of the opinion that a sufficient number of ophthalmic dispensers have become registered and licensed, or not later than 18 months from the date of establishment of the Transitional Governing Board". The Act does not specify that ophthalmic dispensers provide services solely on a prescription. Regulations establishing qualifications, licenses, standards of conduct, competence and proficiency, restrictions, conditions and limitations of services are to be formulated by the Transitional Governing Board, but these can be required by the Minister and ordered by the Lieutenant Governor-in-Council. The Act does not prevent retail merchants engaging in ophthalmic dispensing if an ophthalmic dispenser is in charge of the practice. Unlicensed practice or use of titles is subject to fines not exceeding $200 for the first offence and not exceeding $400 for each subsequent offence. The fines for corporations are $1000 and $2000 respectively.

d. Demographic Characteristics of Dispensing Opticians

The number of dispensing opticians working in British Columbia is not known. A recent search through the B.C. Telephone Directories has revealed that there are 223 dispensing optician outlets listing themselves in the "Yellow Pages" (Table 29). The Association of Dispensing Opticians has reviewed the list and identified that only 164 of these outlets were known to have opticians that are members of the Association. Table 29 also indicates that there are no outlets in the Regional Hospital Districts of Sunshine Coast, Mount Waddington, Central Coast, Kitimat-Stikine, Bulkley-Nechako, and Stikine.

Table 29: Number of Dispensing Opticians Outlets[1] in British Columbia by Regional Hospital District for the year 1976

	Regional Hospital District	Total Number	Number with a member of the Dispensing Opticians'Association*
1.	East Kootenay	2	2
2.	Central Kootenay	1	1
2a.	Kootenay Boundary	3	2
3.	Okanagan-Similkameen	5	5
4.	Columbia-Shuswap	2	0
5.	North Okanagan	6	6
6.	Central Okanagan	10	8
7.	Thompson-Nicola	12	8
8.	Cariboo	3	3
9.	Squamish-Lillooet	1	0
10.	Fraser-Cheam	6	4
11.	Central Fraser Valley	6	5
12.	Dewdney-Alouette	5	4
13.	Greater Vancouver	114	80
14.	Sunshine Coast	0	0
15.	Powell River	1	1
16.	Mount Waddington	0	0
16a.	Central Coast	0	0
17.	Skeena-Queen Charlotte	2	1
18.	Kitimat-Stikine	0	0
19.	Bulkley-Nechako	0	0
20.	Fraser-Fort George	7	5
21.	Peace River-Liard	1	1
22.	Stikine	0	0
23.	Capital	24	17
24.	Cowichan Valley	3	3
25.	Nanaimo	5	4
26.	Alberni-Clayoquot	2	2
27.	Comox-Strathcona	2	2
	TOTAL	223	264

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[1] Dispensing Optician Outlets found by searching through the B.C.Telephone books, augmented by outlets known to the Dispensing Opticians' Association

* At least one member is known to be at these specific dispensing outlets in this region

Prepared by:

Health Manpower Research Unit
University of B.C.

An estimate has been made in Table 30 of the total number of persons practicing dispensing opticianry in the Province of British Columbia by very broad regional groupings which are used by the Association. The average number of members per outlet containing members was determined for each main Provincial area: this varies from as low as 2.00 per outlet in the Kootenay Valley area, to as high as 3.06 per outlet in the Greater Vancouver area. It was then assumed that an outlet with a member would probably have all eligible opticians in that unit also as members, (except apprentices in training). This statistic, number of members per outlet, was then applied to the total number of outlets in the Province and the estimated number of persons practicing as dispensing opticians was then calculated to be 610. Thus by this method, approximately 73% of dispensing optician manpower are members of the Association of Dispensing Opticians and have met, or have been assumed to have experience and competence to meet, Canadian Guild Standards.[1]

Due to the lack of a registration and licensing system for dispensing opticians, the growth and attrition rates cannot be established.

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[1] This estimate is based upon two assumptions: (a) that all dispensing opticians working within establishments identified as having members of the Association are in fact members; and (b) that the average number of opticians working in Association member establishments equals the average number of opticians working in non-Association member establishments.

Table 30: Estimate of the Number of Dispensing Opticians in British Columbia, 1976

	Members	Outlets with Members	Number of Members/Outlet	Total Outlets	Estimated Opticians
Greater Vancouver	245	80	3.06	114	348
Vancouver Island	70	28	2.50	36	90
Okanagan Valley	61	27	2.26	35	79
Fraser Valley	36	13	2.77	17	47
ariboo & North Coast	25	11	2.27	15	34
Kootenay Valley	10	5	2.00	6	12
TOTALS	447	164		223	610

repared by:

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e. Workload of Dispensing Opticians

Services rendered by dispensing opticians are not insured under the B.C. Medical Services Plan; therefore there is no information available regarding the workload or productivity of this important group of vision-care workers. A recent series of hearings have been held into the entire lens and spectacle fabricating industry which may contain these statistics.

6. THE ORTHOPTIST

a. Definition and Role

An Orthoptist is a person who has a certificate of qualification in orthoptics, issued by a medically sponsored examining body recognized in the country in which orthoptics is being practiced (Canadian Orthoptic Council), and which entitles this person to practice in that field (OABC, 1977). Under the direction of the Ophthalmologist, the Orthoptist undertakes the diagnosis and treatment of all types of strabismus and other conditions which cause disturbance of normal binocular vision (OABC, 1977).

An Orthoptist is expected to competently evaluate, diagnose and treat under supervision, if indicated, all types of ocular conditions which cause the disturbance of normal binocular vision, and that have been referred by the Ophthalmologist (OABC, 1977).

In addition to carrying out these duties, orthoptists are given instruction in various parts of the visual examination, and hence may act as an ophthalmic assistant in the ophthalmologist's office.

Orthoptists have also been employed by the provincial government to assist in the planning and operation of vision screening programmes for the early detection of vision problems in school children. It is important to note that the orthoptist is considered to be a paramedical vision care person.

b. Training of Orthoptists

In Canada students in orthoptics are required to have completed one year of university education before entering a 24-month course at an accredited orthoptic school. In the United States this training period must be preceded by two years of university education. In addition to the Vancouver General Hospital Eye Clinic, which is administered by the Department of Ophthalmology of the University of British Columbia Medical School, there are accredited orthoptic training programmes at the University of Saskatchewan, the Sick Childrens' Hospital in Toronto and one French language programme.

Students receive education in the basic sciences, as they relate to the eyes, and in a variety of techniques used in the treatment of binocular vision disorders. Additional training is taken in various aspects of the visual examination which the orthoptist might perform under the supervision of an ophthalmologist.

Following the 24-month training period, there are written, practical, and oral examinations for orthoptists. The successful candidate is granted a certificate by the Canadian Orthoptic Council

c. Legislation and Regulations governing Orthoptists

There exists no legislation in British Columbia which regulates orthoptists; these people work solely under the direction of an ophthalmologist, and hence their activities are regarded as the legal responsibility of that practitioner. The Canadian Orthoptic Council, which certifies orthoptists to work in Canada, does adhere to a Code of Ethics which outlines a strict standard of conduct and prohibits members of the Canadian organization from working for optometrists or any other personnel except ophthalmologists. Pertinent sections of that Code are:

> (3) I will perform orthoptic work only when prescribed by an ophthalmologist.
>
> (4) In order to protect my legal and ethical position, I agree to receive remuneration only from my employing ophthalmologist, group of ophthalmologists, hospital or medical centre.
>
> (7) I will not act as instructor to laymen or to other orthoptists or students who have not complied with the requirements for training prescribed by the Council.

The Canadian Orthoptic Council is the Council responsible to the Canadian Medical Association and the Canadian Ophthalmological Society for insuring adequate academic and ethical standards in the practice of orthoptics. There are, however, no standards for practice and no provincial licensure or restriction of the word "orthoptics" to this specific group of workers.

d. Demographic Characteristics of Orthoptists.

Presently there are 22 certified orthoptists in British Columbia, 16 of whom are currently employed and 6 non-active. Those personnel are working in hospital eye clinics (5), ophthalmologists private offices (8), and for the Metropolitan and Provincial Health Services (3). Of the above total 8 are in the age class 25 to 29 years and 6 are in the 30 to 34 year age class. No information on migration rates is available to the Task Force.

Certification by the Canadian Orthoptic Council is required for orthoptists employed in hospitals, Metropolitan and Provincial Health Departments and, so far as the Task Force knows, in all ophthalmologists offices. However, because formal licensure is not required by legislation in British Columbia, it is not possible to determine how many persons trained in orthoptics by methods other than that required by the Canadian Orthoptic Council are presently employed in ophthalmic offices.

e. Workload of Orthoptists.

Claims to the B.C. Medical Services Plan for services performed by orthoptists employed and supervised by ophthalmologists are made by the supervising ophthalmologist and all orthoptists are employed on salary.

The Task Force has been able, however, to obtain some information on the workload of some of the orthoptists employed in the Vancouver Metropolitan area (M. Mitten). These statistics and other details are shown in Appendix IV.

7. THE OPHTHALMIC NURSE

The Ophthalmic Nurse is a Registered Nurse (R.N.) who has special training in ophthalmic disease, having trained in a Canadian medical center, e.g., a teaching hospital related to a medical school (BCMA, 1977).

The Ophthalmic Nurse should be capable of assisting the Ophthalmologist in medical and surgical care of ophthalmic problems.

8. THE OPHTHALMIC ASSISTANT

The Ophthalmic Assistant is a technician trained in making preliminary assessments of visual functions (BCMA, 1977). This person may receive instruction directly from an educational institution or through home study courses, in Canada or the U.S.A.

The Ophthalmic Assistant may be located in a practitioner's office, or in hospitals or clinics, assisting in the preliminary assessment of the specific eye examinations for which the practitioner is directly responsible.

9. THE PUBLIC HEALTH NURSE

The Public Health Nurse is a registered nurse who has additional preparation in community health nursing either at the diploma or baccalaureate level.

The Public Health Nurse conducts a vision screening and referral program for children in her health unit. This includes conducting and supervising the administration of visual acuity and stereopsis testing, and appropriately identifying those children with vision defects.

10. THE OCULARIST

The Ocularist is a technician concerned with the fitting and care of prosthetic (i.e. "false") eyes. No formal training program for this specialty is known, nor are there any licensing requirements in British Columbia.

11. PARA-OPTOMETRIC PERSONNEL

Most optometrists employ optometric assistants or technicians. Such personnel assist in practice management, office procedures, and with various technical duties related to the optometric examination and the care and management of the case.

In British Columbia optometric assistants and technicians usually receive on the job training, and the extent of their skills and responsibility is determined by the practitioner with whom they work.

There is no formal training in Canada at present for technical assistants, although a 1-year regional college course in Ontario provides training in optometric practice management and secretarial duties. In the U.S. there are about 20 educational and training programmes at various colleges and Universities for para-optometric personnel offering a course from 1 to 3 years. Graduates from these programmes provide ancillary services from practice-receptionist to the more highly skilled personnel assisting in clinical procedures.

CONTACT LENS FITTING

A major area of concern to the Task Force, to the Department of Health and to the general public is the prescribing, dispensing and fitting of contact lenses. The Task Force is not able to obtain statistics to indicate what proportion of persons have shifted from spectacles to contact lenses. Technical advances have greatly improved both the quality and the comfort of the lenses. The entire contact lens industry is a growth industry, but there is no provincial act with regulations to govern the dispensing and fitting of these lenses. The periodic appearance of newspaper advertisements and the concerns expressed in the Action Line column[1] of the Province summarize the problem faced by professionals who regard the contact lense either as a device to be fitted under the ultimate responsibility of the ophthalmologist who writes the prescription, or as part of the total professional responsibility of the optometrist.

The Optometric Association has repeatedly encountered difficulty in limiting the extensive contact lens work carried out by the dispensing opticians in a manner which, to the Optometric Association, appears to be the practice of optometry and therefore illegal under the Optometry Act. Recently the Optometric Association has recommended changes in the definition of the practice of optometry to the Attorney-General of British Columbia; the changed definition would in fact effectively limit the use of certain measuring instruments to optometry and ophthalmology.

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[1] For example, Action Line on March 31, 1977 responded to a letter from a client of a contact lens firm who was unable to receive a refund because the firm had gone out of business. The Minister of Health indicated that this matter would be included in the area of study to be conducted by the Vision Care Task Force.

Ophthalmologists, on the other hand, usually delegate the fitting of contact lenses to the dispensing optician. A small number of ophthalmologists actually fit contact lenses themselves, and a special fee to cover this service is included in the Relative Value Guide to Fees published by the British Columbia Medical Association (1976). The Dispensing Opticians Association has stated:

> It is the desire of Opticianry to provide a prescription dispensing service that is responsible, reliable, and reasonable in cost. Legislation licensing opticians and the ensuing responsibility, can and would provide the discipline necessary to attain this standard and maintain it in the public interest. (Stewart, 1977).

Certain instruments, such as a keratometer, are used by Guild opticians and optometrists for different purposes. It is commonly accepted that "over-refraction" is an essential component of the fitting procedure. The fitting of contact lenses appears to be an area where there are important semantic differences between the opticians and optometrists.

The whole area is made more complicated by the fact that the lack of a system of registration and licensure means that it is possible for a person to walk into an unethical opticianry outlet and obtain contact lenses fabricated from the power of the spectacles which he is already wearing, or to walk out of an ophthalmologist's office with a prescription which, because the patient chooses to have it filled from an unethical contact lense dispenser, may be significantly altered without knowledge either of the patient or the ophthalmologist who wrote the prescription. The difficulty is that the Vision Care Task Force has no statistics of the frequency of this type of activity.

It is the opinion of the British Columbia Optometric Association that optometry and ophthalmology must accept the responsibility of prescribing and fitting contact lenses as the "only academically trained personnel to carry out and supervise this professional service" (McRoberts, 1977). Optometrists maintain that to fit contact lenses, certain professional judgments must be made that require a comprehensive background in physical optics, physiological optics, anatomy, physiology, pathology, pharmacology, and extensive clinical technique. The case has been put that to provide dispensing opticians with this training would in fact duplicate the training of optometrists and result in a third practitioner being prepared to serve in eye care delivery (McRoberts, 1977).

The Vision Care Task Force has briefly examined the training programmes for ophthalmologists, optometrists and dispensing opticians in this field.

Ophthalmologists receive 150 hours of experience in a contact lens clinic during the second and third years of their residency programme. Every ophthalmologist who has been trained during the past 15 years is considered qualified to judge the fit of contact lenses. Nevertheless, not many ophthalmologists presently fit these lenses, nor do they give specific readings for the fabrication of the lenses, delegating this to the dispensing optician.

Ideally ophthalmologists feel that contact lens fitting should be considered a medical act. The Canadian Ophthalmological Society feels that more of its members should become involved in the active fitting of contact lenses, but in certain circumstances, fitting by optometrists and opticians could be considered, provided that guidelines for supervision and referral of problems are present (COS, 1975).

Optometrists receive theoretical instruction in contact lens therapy, as well as clinical experience, in the third and fourth professional years:

1) The student is involved in the entire contact lens fitting experience; the examination, screening out poor risk candidates, lens fabrication, lens modification, progress monitoring and management, final discharge and case write-up.

2) Each student processes an average of 40 contact lens patients in his final two years.

3) The student attends 41 lecture hours, 26 laboratory hours, 224 clinic hours in contact lens training.

Dispensing opticians who wish to do so may take a contact lens home study course. The course prepares a Guild member to dispense contact lenses, though modification of the lens and careful measurements of the eye and cornea are also taught, since the dispenser also fits the lens to the human cornea. In all of this the ethical Guild member regards himself as the agent of the physician and arranges for the ophthalmologist's final evaluation, providing him with a copy of all readings and modifications.

PROBLEMS IN THE VISION CARE SYSTEM

It will be immediately clear that no single vision care system exists within the Province of British Columbia; rather there are three overlapping systems already described. These systems are competitive, within the restrictions that may exist through established fees set by the Medical Services Plan and the fabrication of spectacles and lenses by a small number of companies. It is further clear that an individual patient may find it difficult to move from one system to the other. As a result, certain information crucial to the health of the eyes may not be passed from one system to the other, to the detriment of the patient. In practice, however, particularly in small communities, information is freely exchanged between systems to the benefit of the patient.

A cooperative vision care system actually exists within the Veterans Administration Hospital System in the United States of America (Myers, 1977) where joint clinics do exist at selected VA hospitals. Myers (1977) also reviews the experiences in the armed forces and in certain third-party payment programmes such as at Kaiser-Permanente:

> These programs have done much to substantiate the widespread feeling that once economic externalities of private practice are removed, ophthalmologists and optometrists soon evolve efficient divisions of professional duties, establish referral guidelines, and develop equitable professional and personal relations.
>
> It seems a bench mark that good relations usually thrive where competition for patients is absent and full-time ophthalmologists and optometrists work side by side for considerable periods in common clinics.

The Vision Care Task Force has attempted to determine the conditions which will encourage a free movement of patients from one system to the other. These conditions are complicated, and involve the mutual trust and cooperation of the three principal disciplines; ophthalmology, optometry, and opticianry. But this trust is not easy to obtain because of a long background of suspicion, litigation, and interference. The very fact that the Vision Care Task Force has remained in meetings is a reflection of the strong and sincere desire on the part of the three disciplines to bring about some coordination of activities for the ultimate good of the patient. In such good faith, the Task Force members have identified the necessity of improving the education, the ease of referral and the qualifications of each discipline, and of enshrining these in Acts and Regulations. It should be noted that optometrists do not feel that their training programmes are deficient, or that ophthalmologists should be placed upon their examining board. That ophthalmologists feel that they could use licensed optometrists to train ophthalmological residents and use licensed optometrists in their own practices of ophthalmology. That opticians do not feel that optometrists have a right to express any opinion about a new act regulating the practice of dispensing opticianry. These actions when put together verify the measure of trust necessary to bring about a change.

The Vision Care Task Force therefore concludes that it is possible to bring about a coordinated vision care system for the Province of British Columbia and to this end makes the following recommendations for legislative changes.

Recommendation 1. THAT THE RESPECTIVE BODIES INVOLVED IN COOPERATION ON VISION CARE RECOMMENDATIONS MAKE APPROPRIATE CHANGES TO THEIR RESPECTIVE ACTS, REGULATIONS AND ETHICAL POSITIONS TO PERMIT DIRECT AND RECIPROCAL REFERRALS OF PATIENTS BETWEEN OPTOMETRISTS AND OPHTHALMOLOGISTS, AND BETWEEN OPTOMETRISTS AND GENERAL PRACTITIONERS.

Recommendation 2. THAT THE REGULATIONS GOVERNING PAYMENT OF OPHTHALMOLOGISTS UNDER THE MEDICAL SERVICES ACT BE AMENDED TO PERMIT PAYMENT OF A CONSULTANT FEE TO OPHTHALMOLOGISTS WHO ATTEND PATIENTS REFERRED BY AN OPTOMETRIST.

Recommendation 3. THAT THE CODE OF ETHICS IN THE REGULATIONS GOVERNING THE PRACTICE OF OPTOMETRY UNDER THE OPTOMETRY ACT SHALL BE CHANGED TO ENSURE:

> IT WOULD ALWAYS BE THE DUTY OF EVERY OPTOMETRIST TO REFER TO THE APPROPRIATE MEDICAL PROFESSIONAL THOSE PATIENTS IN WHOM HE SUSPECTS OR DETECTS ANY CONDITION THAT IS OF A NATURE THAT DEMANDS SUCH REFERRAL. THIS DUTY WILL EXTEND TO ALL
>
> - INTERNAL AND EXTERNAL OCULAR ABNORMALITIES;

- DEVIATIONS IN VISUAL ACUITY NOT PREVIOUSLY EXPLAINED;
- HISTORY OF FAMILIAL OCULAR AND SYSTEMIC CONDITIONS NOT PREVIOUSLY IDENTIFIED BY A PHYSICIAN.

Recommendation 4. THAT A COLLEGE OF OPTOMETRISTS BE ESTABLISHED TO REPLACE THE PRESENT BOARD OF EXAMINERS IN OPTOMETRY IN BRITISH COLUMBIA. THE COLLEGE WOULD BE COMPOSED OF ALL MEMBERS LICENSED TO PRACTISE UNDER THE OPTOMETRY ACT OF THE PROVINCE AND WITH A COUNCIL MADE UP OF SEVEN (7) MEMBERS; FIVE MEMBERS OF THE COLLEGE OF OPTOMETRISTS ELECTED BY THE MEMBERSHIP AND TWO PERSONS APPOINTED BY THE LIEUTENANT GOVERNOR. THE COUNCIL WILL ESTABLISH AND REGULATE STANDARDS OF KNOWLEDGE AND COMPETENCY, STANDARDS OF QUALIFICATIONS TO PRACTISE, STANDARDS OF PROFESSIONAL CONDUCT AND WILL ADMINISTER THE ACT.

The above recommendations arise from the review of legislation and regulations in this report.

It is also clear to the Task Force that an act is urgently required to regulate dispensing opticians in this province. The following recommendations describe the legislative and other requirements which should be contained in the Act and Regulations.

Recommendation 5. THE MINISTER OF HEALTH, IN CONJUNCTION WITH THE DISPENSING OPTICIANS ASSOCIATION OF BRITISH COLUMBIA, AND AFTER APPROPRIATE REVIEW BY THE COLLEGE OF PHYSICIANS AND SURGEONS OF BRITISH COLUMBIA, THE BRITISH COLUMBIA MEDICAL ASSOCIATION, AND THE BRITISH COLUMBIA OPTOMETRIC ASSOCIATION, PREPARE AND SUBMIT TO THE LEGISLATIVE ASSEMBLY OF THE PROVINCE AN ACT RESPECTING DISPENSING OPTICIANS. THIS ACT IS URGENTLY REQUIRED AND SHOULD ENSURE:

a. RESTRICTION OF THE DISPENSING OF GLASSES OR THE FITTING OF CONTACT LENSES TO THOSE PERSONS WHO ARE PROPERLY TRAINED;

b. THE ESTABLISHMENT OF A TRAINING PROGRAM FOR DISPENSING OPTICIANS, AND A MECHANISM TO APPROVE THAT PROGRAM.

c. LICENSING OF DISPENSING OPTICIANS IS GRANTED AFTER ASSURANCE BY AN EXAMINING BOARD THAT THEY ARE PROPERLY QUALIFIED TO PRACTICE;

d. ALL DISPENSING OPTICIANS CURRENTLY PRACTICING IN THIS PROVINCE SHALL, WITHIN TWO YEARS, POSSESS THE QUALIFICATIONS SET BY THE BOARD IN ORDER TO OBTAIN A LICENCE;

e. SPECIAL QUALIFICATIONS BE REQUIRED FOR THOSE FITTING CONTACT LENSES, NAMELY:

  i. CONTACT LENS DISPENSERS MUST BE SPECIALLY CERTIFIED;

  ii. INITIALLY THE EXAMINING BOARD SHALL CONTAIN AT LEAST ONE OPHTHALMOLOGIST, AND AT SOME TIME IN THE FUTURE IT MAY BE DESIRABLE TO INCLUDE AN OPTOMETRIST;

  iii. CERTIFIED CONTACT LENS DISPENSERS MUST HAVE:

  -- COMPLETED A RECOGNIZED CONTACT LENS FITTING COURSE,

-- PASSED AN EXAMINATION EITHER SET OR APPROVED BY THE EXAMINING BOARD,

-- SPENT ONE YEAR OF SUPERVISED TRAINING UNDER A CERTIFIED CONTACT LENS DISPENSER,

-- DEMONSTRATED ADEQUATE TRAINING WITH RESPECT TO REQUIRED INSTRUMENTATION AS DETERMINED BY THE EXAMINING BOARD;

iv. THE CERTIFIED CONTACT LENS DISPENSER MUST BE A HOLDER OF A VALID DISPENSER'S LICENCE (I.E., MUST FIRST BE A QUALIFIED DISPENSER),

f. THE CERTIFIED CONTACT LENS DISPENSER MUST BE PERMITTED TO USE ANY DEVICE NECESSARY IN MEASURING AND EVALUATING THE FIT OF CONTACT LENSES, PROVIDING THESE DEVICES ARE USED FOR THESE PURPOSES ONLY.

q. CONTACT LENSES SHALL ONLY BE DISPENSED BY A CERTIFIED CONTACT LENS DISPENSER PURSUANT TO A WRITTEN SIGNED ORDER BY, AND ONLY UNDER THE SUPERVISION OF A DULY QUALIFIED OPHTHALMOLOGIST OR OPTOMETRIST.

SUPERVISION MEANS THAT THE OPTOMETRIST OR THE OPHTHALMOLOGIST SHALL INITIATE THE PRESCRIPTION, ASSESS THE ADEQUACY OF THE FIT AND ASSUME THE FINAL RESPONSIBILITY FOR THE EVALUATION OF THE CONTACT LENS PATIENT.

h. UNLESS OTHERWISE SPECIFIED, A WRITTEN CONTACT LENS PRESCRIPTION BY AN OPHTHALMOLOGIST OR OPTOMETRIST AUTHORIZES THE CONTACT LENS DISPENSER TO MEASURE THE CORNEAL RADIUS AND TO ADJUST THE SPHERICAL LENS POWER WITH TRIAL LENSES ONLY BY NOT MORE THAN ONE DIOPTER.

i. THE CONTACT LENS DISPENSER SHALL NOT REFRACT, OVER-REFRACT OR MAKE EVALUATIONS WITH REGARD TO THE HEALTH AND FUNCTION OF THE LIVING EYE, OTHER THAN THAT PERMITTED IN RECOMMENDATION 5(h) OR WHERE MODIFICATIONS FOR EFFECTIVE LENS POWER ARE FOUND TO BE NECESSARY.

j. THE RECOMMENDED ETHICAL PROCEDURES FOR THE FITTING OF CONTACT LENSES INVOLVE THE FOLLOWING.

-- A PRESCRIPTION. THE PRESCRIPTION MUST CONTAIN APPROVAL FOR CONTACT LENSES;

-- THE PRESCRIBER'S PATIENT MUST BE REFERRED BACK FOR FINAL EVALUATION AND APPROVAL. KERATOMETER

READINGS, LENS TYPES, SOLUTIONS BEING USED, AND ANY OTHER INFORMATION THE PRESCRIBER MAY REQUEST, SHALL BE FORWARDED.

-- AFTER FINAL EVALUATION AND APPROVAL, ANY FURTHER MODIFICATIONS MUST REQUIRE THE PERMISSION OF THE PRESCRIBER.

Recommendation 6. APPROPRIATE CHANGES BE MADE IN THE OPTOMETRY ACT WITH ITS REGULATIONS, AND REFERENCE BE MADE IN THE PROPOSED DISPENSING OPTICIANS ACT OR IN ITS REGULATIONS TO COVER THE USE OF ANY DEVICES NECESSARY TO FIT CONTACT LENSES, BUT PROHIBITING THE USE OF THESE DEVICES FOR ANY OTHER PURPOSE.

Recommendation 7. APPROPRIATE CHANGES BE MADE IN THE OPTOMETRY ACT OR IN THE REGULATIONS TO THE OPTOMETRY ACT THAT WILL FREE THE FLOW OF OPTOMETRIC CONTACT LENS PRESCRIPTIONS TO DISPENSING OPTICIANS, PROVIDING THAT AN ADEQUATE DISPENSING OPTICIANS ACT HAS BEEN ESTABLISHED AND A TRAINING PROGRAM DEVELOPED THAT ENSURES COMPETENCY AND RESPONSIBILITY IN CONTACT LENS FITTING.

The Attorney General's Department has noted that new professional Acts might consider the use of civil rather than criminal courts to deal with penalties for unlicensed or irregular practitioners. This practice was followed in the recent Psychologists Act where any individual who practices or who may pretend to practice as a psychologist in contravention to the Act may, in civil action, be dealt with by the Board or any other person applying to the Supreme Court, which on proof that the individual has contravened the Act, shall order him to pay the Board or other person $500 for each day the contravention occurred or continued. It is suggested that this practice might be suitable for inclusion in the proposed Dispensing Opticians Act.

THE NEED FOR VISION CARE SERVICES AND THE DISTRIBUTION OF THOSE SERVICES IN BRITISH COLUMBIA

The need for vision care is a function of the number of individuals who have visual problems and the time between examinations. Obviously more than visual acuity and dysfunction is of concern: eg. latent or manifest strabismus in young children and elevated intraocular pressure in persons of middle age or older will be identified if the visual acuity is checked and certain other screening tests are performed. Vision care and eye care are thus greatly inter-related.

The proportion of each age group in the population with vision care needs is not known. The frequency of visual acuity problems in the United States has been measured in the National Health Survey (Public Health Service, 1964, 1973a, 1973b). Boyd has estimated the frequency in Canada of the population needing glasses (Boyd, 1965). Other official estimates have been made by optometric groups (BCOA, 1973; COA, 1965). An attempt was made in the Shillington and Anderson Report (1974) to summarize these estimates. Another attempt, modified slightly from the 1974 report, has been made in Table 31; a specific mean has been selected for each age group from these non-comparable estimates.

The above table supports the widely held view that there are four distinct categories of the population which differ in vision characteristics and the need for vision care . The Canadian Association of Optometrists (1975) has identified the following groups:

Table 31: Vision Care Needs in Percentage by Age Group, from Various Sources

Age Groups	Boyd's estimates[1]	U.S.National Health Survey[2]	B.C. Optometric Association[3]	Canadian Optometric Association[4]	Summary Statistics[5]
0 - 4	6.0			2.5	6.0
5 - 9	8.0	8.0	12.0	19.0	9.0
10 - 14	31.5	17.0	18.0		25.0
15 - 24	34.5	18.0	32.0	28.0	30.0
25 - 34	41.5	20.0		39.0	35.0
35 - 44	100.0	25.0		45.5	55.0
45 - 54	100.0	82.0	99.0	60.0	85.0
55 - 64	100.0	100.0		77.0	90.0
65+	100.0	100.0		90.0	95.0

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[1] Boyd, 1965.

[2] Public Health Service, 1964, 1973a, 1973b.

[3] British Columbia Optometric Association, 1973.

[4] Canadian Association of Optometrists, 1965.

[5] These statistics are used in Table 32.

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a. Pre-School : This category includes children up to the age of 5 years. Visual development is especially important in this group. The prevalence of vision problems in this age group is estimated to be 6 percent or greater.

b. Childhood and Youth: There is a steady increase in vision problems, commencing around school age and involving perhaps 10% of children age 5 - 9. This rises sharply to approximately 30% in youths age 15 - 24.

c. Adult (25 - 45): Visual development stabilizes by age 25 and does not produce much observable developmental change until the decade of the forties.

d. Middle Age and Maturity (45 - 70): Most people require vision care services several times during this period. Further, cataracts, glaucoma, and degenerative eye diseases appear with increased frequency.

e. Old Age (70 and over): There is a great increase of vision problems during the sixties, and nearly 100% of the population over 70 need professional care.

There is no generally accepted estimate of the advisable duration between eye examinations for those who need it, the second statistic required to calculate population need for services. Existing practice of the B.C. Medical Plan is to permit and pay for all examinations that are deemed to be necessary by the practitioners concerned. Boyd (1965) made estimates which he considered to be very conservative, and when these were used by Shillington and Anderson in 1974, there was found to be a considerable overutilization of refractive services by the provincial population. More appropriate estimates would be those derived from current ophthalmological practice as the "recommended" period between examinations. A set of estimates was prepared by a Task Force member, Dr. A. J. Elliot, and are reported in Table 32 along with those of Boyd (1965). The percentage of a given age group which annually requires vision care is shown in the last column of this table; the proportion rises from as low as 6 percent per year for the population under five years, to as high as 32 % per year for the population 65 years and over.

These age-specific percentages have been converted into annual estimates of needed refractive services for each Regional Hospital District in the Province, and at four points in time:

Table 32: Estimate of the Percentage of the Population by Age Group Requiring Vision Care each Year

Age Group	Percentage with need[1]	Years between examination		Percentage of the population group requiring an examination each year[4]
		Boyd[2]	Elliot[3]	
0 - 4	6.0	1	1	6.0
5 - 9	9.0	2	1	9.0
10 - 14	25.0	2	2	12.5
15 - 24	30.0	5	2	15.0
25 - 34	35.0	5	3	11.7
35 - 44	55.0	5	3	18.3
45 - 54	85.0	2	2	42.5
55 - 64	90.0	5	3	30.0
65+	95.0	5	3	31.7

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[1] Last column, Table 31.

[2] From Boyd, 1965.

[3] From A. J. Elliot, 1977.

[4] Column 1 ÷ Column 3, i.e. based upon A. J. Elliot's recommendations.

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1976, 1981, 1986 and 1991.[1]

Table 33 indicates that approximately 19% to 20% of the population will require a refractive examination annually.[2]

It will be recalled from the discussion of the work activities and competencies of ophthalmologists that a "refractive examination" cannot be immediately identified in the fee-schedule, and therefore cannot be accurately identified in the service volume paid to a practitioner by the Medical Services Commission for services rendered under the B.C. Medical Services Plan. A refraction is usually included (if needed) in any consultation performed by an ophthalmologist, though the consultation may be performed for reasons related to ocular pathology.

In total, the number of refractive examinations has been increasing since 1970 (Table 13), and by April 1, 1976, had reached 523,015 services (Table 34). But the total number of needed refractive examinations during that same time period was only 474,311 (table 33). The number of refractions provided in

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[1] Population estimates for these four time periods have been taken from B.C.Research Council (1974), and are generally considered to be rather generous. Detailed estimates by age group will not be available even for the 1976 census until late 1977. The B.C.Research Council estimates were originally commissioned by the Ministry of Health for the Children's Dental Health Study, and are therefore known to that Ministry. Though they are likely high, they have the virtue of familiarity.

[2] This is an average figure and does not take into account variations in age mix among regional districts.

Table 33: Predicted Number of Needed Refractive Services
by Regional Hospital District⁎

Regional Hospital District	1976	1981	1986	1991
1. East Kootenay	8143	9718	11623	13897
2. Central Kootenay	8986	9541	10209	10814
2a. Kootenay Boundary	6022	6302	6694	6957
3. Okanagan-Similkameen	9985	10796	11293	11660
4. Columbia-Shuswap	6711	7847	9017	10290
5. North Okanagan	7624	8528	9365	10199
6. Central Okanagan	13054	15641	17604	19531
7. Thompson-Nicola	16881	20957	25234	29866
8. Cariboo	7715	9361	11269	13477
9. Squamish-Lillooet	2547	3078	3712	4416
10. Fraser-Cheam	9517	10468	11370	12358
11. Central Fraser Valley	13214	15547	17806	20300
12. Dewdney-Alouette	8828	10350	11634	12760
13. Greater Vancouver	225672	256275	289160	323737
14. Sunshine Coast	2215	2522	2782	2968
15. Powell River	3663	4292	5044	5834
16. Mount Waddington	1739	2031	2443	2914
16a. Central Coast	579	587	635	686
17. Skeena-Queen Charlotte	4057	4759	5704	6805
18. Kitimat-Stikine	7424	9493	12048	14957
19. Bulkley-Nechako	5395	6743	8306	10138
20. Fraser-Fort George	13916	18157	22825	28211
21. Peace River-Liard	8420	10190	12122	14354
22. Stikine	262	291	336	388
23. Capital	46729	50111	53122	56222
24. Cowichan Valley	8072	9053	10185	11473
25. Nanaimo	11209	12857	14347	15826
26. Alberni- Clayoquot	5729	6302	6976	7660
27. Comox-Strathcona	10011	11934	13987	16240
TOTAL*	474,311	543,727	616,847	694,935
Percentage of Population	19.2%	19.1%	19.3%	19.7%

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* Derived from the total provincial population estimate, not the summation.

⁎ Derived from B.C. Research Council population estimates.

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Table 34: Number of Services Paid by M.S.C. for Fee Schedule codes (2010),(2015),(2899) by Regional Hospital District of the attendant, for the year ending April 1976.

Regional Hospital District	Personal Services Ophthalmology Codes (2010)&(2015)	Personal Services Optometry Code (2899)	Personal Services Total	Referred Out Code (2010)
1 East Kootenay	2041	7257	9298	400
2 Central Kootenay	1020	5994	7004	1124
2a Kootenay Boundary	2319	5344	7663	586
3 Okanagan-Similkameen	4828	4874	9702	798
4 Columbia-Shuswap	0	2128	2128	341
5 North Okanagan	9187	3736	12923	719
6 Central Okanagan	9542	5097	14639	1137
7 Thompson-Nicola	8873	15243	24116	1997
8 Cariboo	1	4309	4310	796
9 Squamish-Lillooet	0	0	0	233
10 Fraser-Cheam	7142	2557	9699	949
11 Central Fraser Valley	8089	4153	12242	3109
12 Dewdney-Alouette	1891	3976	5867	1297
13 Greater Vancouver	173389	93818	267207	42214
14 Sunshine Coast	0	1881	1881	343
15 Powell River	2940	1031	3971	313
16 Mount Waddington	0	0	0	43
16a Central Coast	0	0	0	19
17 Skeena-Queen Charlotte	2	2041	2043	609
18 Kitimat-Stikine	0	4471	4471	312
19 Bulkley-Nechako	0	0	0	722
20 Fraser-Fort George	6022	12247	18269	2861
21 Peace River-Liard	291	5241	5532	461
22 Stikine	0	0	0	79
23 Capital	45125	18608	63733	5656
24 Cowichan Valley	3031	1383	4414	1007
25 Nanaimo	12595	5506	18101	1195
26 Alberni-Clayoquot	765	2986	3751	415
27 Comox-Strathcona	5376	4317	9693	304
Out of Province	0	358	358	355
TOTAL	304469	218546	523015	70962

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1976, therefore, is 10.3% over the estimated number needed. Does this represent over-utilization? In fact, it probably does not. A large portion of ophthalmic consultations are likely for ocular pathology, and is not included in the estimate of need developed in Table 33. For the purpose of this analysis, it has been presumed that there is no current shortage of vision care manpower, and that utilization should continue to run at 110% of the predicted needed number of refractive services. Of these, 13.6% will be in connection with consultations by ophthalmologists (Fee Code 2010), based upon the 1976 experience.

The projections of the refractive service needs by Fee Code are shown in Table 35 for the whole Province, and for five-year periods to 1991. These needs may be compared to the actual supply of vision care manpower by regional district shown in Table 15, and derived from the billings to the B.C. Medical Plan.[1] There is a very great correlation between the number of services provided (Table 34), and the adjusted number of vision care personnel. It is possible, though, to identify a set of regional districts which have a deficiency of refractive services. The following have less than 110% of the predicted

---

[1] There are noted to be an additional 12 physicians who are not certified ophthalmologists providing 6.64 full-time equivalents of ophthalmological services to the population. The table adjusting for these physicians is shown in Appendix VI. In September of 1977, the Medical Services Commission advised these practitioners to obtain their certification within a one year period or lose their privileges as ophthalmologists.

Table 35: Predicted Number of Refractive Services for 1981, 1986 and 1991 by Fee Schedule Item

	1981	1986	1991
Consultation (2010)*	81,342	92,280	103,962
Refractive Services (2015, 2899)	516,758	586,252	660,467
Total≈	598,100	678,532	764,429

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* It is assumed that 13.6% of the total number of services are consultations.

≈ Determined by multiplying the Totals in Table 33 for respective years, by 110%.

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needed number of refractive services: the deficiency in services is also indicated.

Central Kootenay	2881
Okanagan-Similkameen	1282
North Okanagan	5254
Cariboo	4177
Squamish-Lillooet	2802
Fraser-Cheam	770
Central Fraser Valley	2293
Sunshine Coast	556
Powell River	58
Mount Waddington	1913
Central Coast	637
Skeena-Queen Charlotte	2420
Kitimat-Stikine	3695
Buckley-Nechako	5935
Peace River-Liard	3730
Stikine	288
Cowichan Valley	4465
Alberni-Clayoquot	2551
Comox-Strathcona	1319

This does not mean that some of these services are not available: travelling clinics and special programmes such as the Queen Charlotte program clearly have the services provided in one area allocated to another regional district, such as Vancouver, where the practitioner has his office.

Table 35A shows the numerical adjustments for satellite practices in these deficient areas. The table and Figure 12A show that satellite practices help to reduce the deficiency in services, but in only two regional districts (out of the 19 that were theoretically deficient in services) were the deficiencies completely reduced. It can be concluded that although satellite practices are beneficial to the areas they are serving, the service is not adequate. More satellite practices should be encouraged or mobile clinic programs established.

It is appropriate to stress that while there is clearly

Table 35a

SUMMARY OF REGIONAL DISTRICTS WITH DEFICIENCIES OF SERVICES
ADJUSTED FOR FTE SATELLITE PRACTICE

Regional Districts		Current Deficiency	Aid[1] of Satellite OD	Aid[2] of Satellite Ophth.	Aid[3] of Other Physicians	Total	Revised Deficiency
2.	Central Kootenay	2881	-322	0	0	-322	3203
3.	Okanagan-Similkameen	1282	+140	0	0	+140	1142
5.	North Okanagan	5254	+366	-90	0	+276	4978
8.	Cariboo	4177	+294	+162	0	+456	3721
9.	Squamish-Lillooet	2802	+476	+18	0	+494	2308
10.	Fraser-Cheam	770	0	-36	+2225	-36	+1455
11.	Central Fraser Valley	2293	0	-54	0	-54	2347
14.	Sunshine Coast	556	+420	0	0	+420	136
15.	Powell River	58	0	0	0	0	58
16.	Mount Waddington	1913	+378	0	0	+378	1535
16a.	Central Coast	637	+70	+36	0	+106	531
17.	Skeena-Queen Charlotte	2420	+448	+180	0	+628	1792
18.	Kitimat-Stikine	3695	-448	+180	0	+268	3527
19.	Bulkley-Nechako	5935	+1386	+72	0	+1458	4477
21.	Peace River-Liard	3730	0	0	0	0	3730
22.	Stikine	288	0	0	0	0	288
24.	Cowichan Valley	4465	0	+808	0	+808	3657
26.	Alberni-Clayoquot	2551	0	+395	+951	+1346	1207
27.	Comox-Strathcona	1319	0	0	+2764	+2764	+1445

[1] OD Aid = FTE Satellite Practice x Aug. OD Productivity (1400).

[2] MD Aid = FTE Satelitte Practice x Aug. Ophth. Productivity (1795).

[3] Other Aid = FTE Satelitte Practice x Aug. Productivity of Ophth. (1795).

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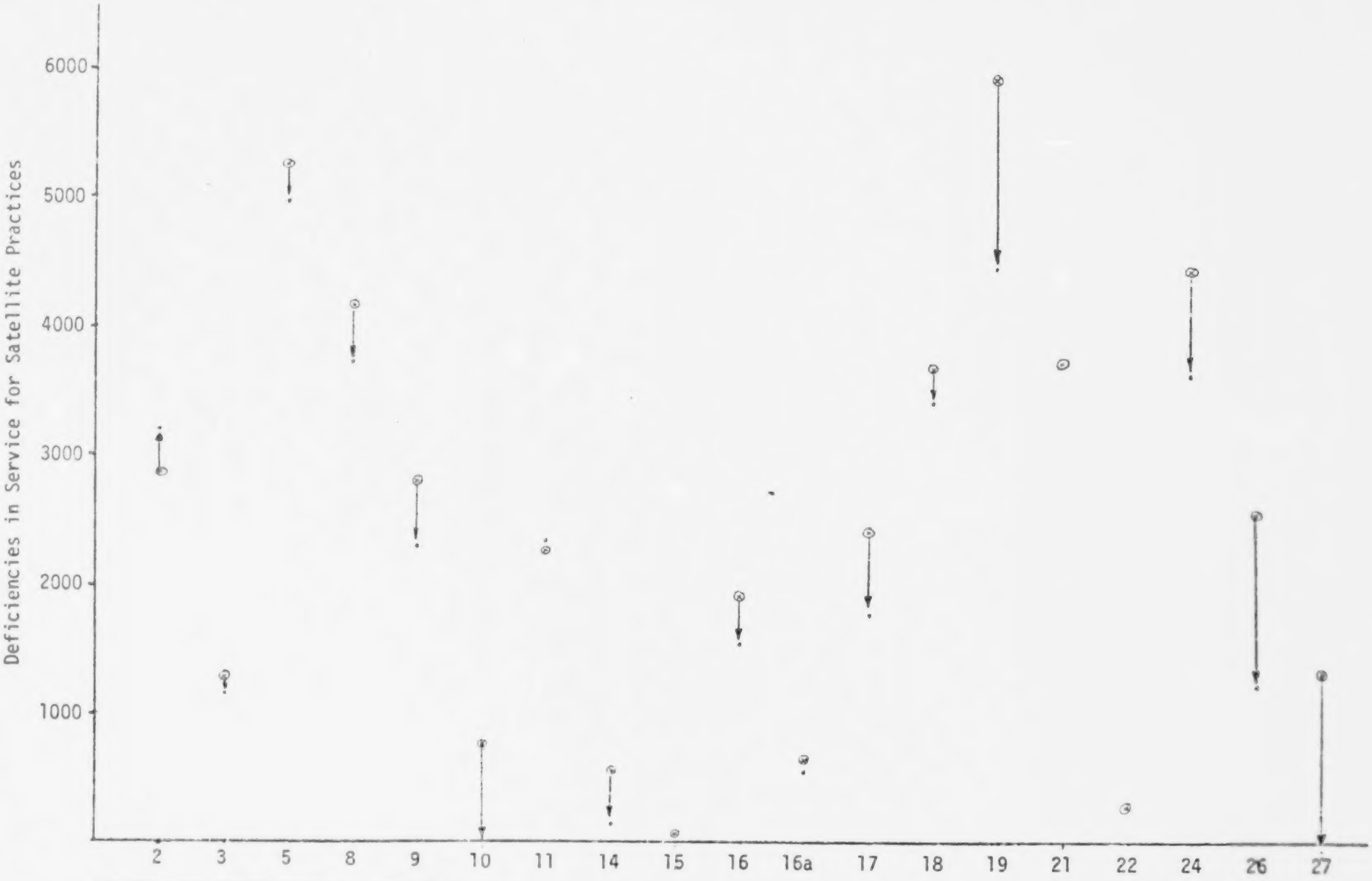
Figure 12a

ADJUSTMENT OF REGIONAL DISTRICTS WITH DEFICIENCIES IN SERVICE FOR SATELLITE PRACTICES



Numbers across bottom represent Regional Districts considerable variation in the distribution of vision care manpower by Regional Hospital District in British Columbia, most areas where manpower is in short supply are isolated, or located on the coast, and therefore relatively inaccessible by road.

Most vision care is non-urgent. Nevertheless, the clustering of ophthalmologists in the metropolitan areas means that many patients must travel considerable distances from their home in a rural area to receive secondary and tertiary eye care. The Vision Care Task Force has been advised that recent optometric graduates are encouraged to consider taking up practice in the rural areas. It is therefore important that all family practitioners and optometrists be adequately trained in the recognition of pathology in order that patients who need referral can in fact be referred promptly.

The distribution of vision care workers is only part of the problem. The availability of dispensing opticians' services is also a barrier to public accessibility. Screening, refractive examinations, referrals to ophthalmologists, prescribing, dispensing and fitting of spectacles and contact lenses are all part of the system, no portion of which can be discarded. This system, however, is made up of overlapping functions, at least two semi-independent systems, and is paid for from both public and private resources and this causes some difficulty in providing visual health care to the population.

It is therefore important to review certain attempts to improve vision care delivery that have been provided by the Provincial Ministry of Health and by the professions.

A. The Public Health Programme

The Ministry of Health provides a programme which has as its objectives

1. Identification of possible visual defects in children;
2. Treatment of identified visual defects;
3. Optimal utilization of the child's visual function.

The responsibility for insuring an acceptable standard of care in the vision screening, referral and follow-up of children in the health unit rests with the district public health nurses each of whom has the responsibility for the screening, or training and supervision of those persons involved in the screening programmes, and for referral and follow-up of children who are found to have vision problems. (Public Health Programs, 1976). Between September 1975 and August 1976, 108,411 school children were tested by 335 Public Health nurses. No evaluation of the case finding, referral system, or effectiveness of this programme has been undertaken as yet.[1]

This programme has considerable value but by itself does not ensure follow-up care. Recommendations to obtain vision examinations are certainly made, but may not be carried out unless there are optometrists or physicians in the area, and even when these exist, cannot be guaranteed because there is no way of ensuring that the parent will comply with the request to take the child to the proper vision care attendant. Further, it does not address the needs of the elderly or middle-aged, except in special programmes, such as clinics for the elderly, which are to be found in some communities.

---

[1] An evaluation is currently under way by Ms. M. Mitten of Community Health Programs and Dr. Annette Stark of the University of British Columbia. This will involve careful follow-up of all children screened in a selected grade.

B. The Mobile Optometry Van

Mobile vision care clinics are self-contained units, providing complete vision care services, which travel to underserviced areas of the province, or to institutions whose patients cannot attend private offices. The mobile unit may be used as a base for mass screenings.

The British Columbia Optometric Association with the aid of the provincial government, purchased a fifth-wheel trailer and truck in 1972 to be used as a mobile optometric clinic. (The total cost was $28,885.65, of which the provincial government contributed $20,500.00.) This unit was similar to those used at the School of Optometry, University of Waterloo.

This mobile clinic was extensively tested in the Kootenay region of the Province during the Summer of 1974. The purpose of the demonstration project was to establish the viability of the clinic in determining the need-areas and meeting the need, and to establish the costs of providing the service. (BCOA, 1974). The planning for the programme was done on a voluntary basis by a committee of members of the British Columbia Optometric Association, and communities were chosen on the basis of requests received from civic authorities, community groups, administrative units and local health units. During the first demonstration project the clinic was staffed by two senior students assigned by the University of Waterloo, and supervision was provided by optometrists serving for one or more days each on a sessional allowance basis (plus travel and living expenses) without an allowance for office overhead. Part way through the demonstration it proved possible to engage an optometrist on a full-time basis.

Overall, 612 patients were examined in nine communities; 28 (4.5%) were referred to physicians or ophthalmologists, and 281 (45.9%) were found to require a spectacle prescription to correct a refractive error or to improve their visual efficiency. Patients were given the option of taking their prescriptions to be filled where they chose, or having them filled by the clinic personnel. The dispensing proved to be the most difficult, troublesome and unsatisfactory aspect of the clinic operation, with long delays in delivery etc.

The financing of the demonstration project of 1974 was from a small grant of $5000 from the Department of Health, sessional allowances for the registered optometrists paid by the Medical Services Commission (at $55.00 per three-and-a-half hour session), fees for dispensing, and the Association itself. The average cost per patient, excluding laboratory materials was in excess of $20.00. It was concluded by the B.C O.A. that both need and acceptance was adequately demonstrated, and the Ministry of Health was urged to consider a better financing formula and assume more responsibility for planning.

This unit was operated again from May 1st to October 31st 1975, with a grant of $12,000 from the Ministry of Health, a six month's salary of $8,000 plus $2000 for overhead paid by the Medical Services Commission for the services of the clinic director, and income from dispensing services. Again two senior optometric internes from the University of Waterloo were involved on the project until August 31st, when a dispensing optician was hired. Problems were encountered with the position of Clinic Director, the development of an extensive itinerary, and the van itself. The programme that second summer was designed to include a number of centres where there were workshops and homes for the retarded and hospitals for the aged. "In choosing a community for mobile clinic services it is accepted that there should be no regular vision and eye care, that the community be at least 40 miles away from any established service and that there is evidence of a desire for the mobile clinic services by health and community leaders in the area" (BCOA., 1975). In total, for the year 1975, there were 1,431 vision examinations made, with 40.4% of these requiring a prescription. Of the prescriptions given, 75.4% were processed through the Clinic. Only 28 patients (1.9% of the total) were referred to a physician or ophthalmologist. The clinic staff was able to process 13.6 patients per working day. The clinic, however, operated at a deficit of in excess of $5,800.00, largely due to an accident to the vehicle.

The second summer of demonstration again showed the necessity for administration and direction of the Mobile Optometric Clinic through the Bureau of Local Health Services in Public Health Programmes. A recommendation was made that the Project Coordinator be employed in this Bureau, salaries be paid through the Ministry of Health, and Public Health Programmes develop the itineraries while the British Columbia Optometric Association would supply the professional (not student) manpower with funding from the Medical Services Commission.

Admittedly, the provision of any health service to people in remote areas is not inexpensive. To consider the use of the mobile vision care clinic solely on the basis of cost, would be to negate the philosophy of adequate health services for all. In 1974, the British Columbia Optometric Association estimated a cost of $20 for each person seen on the mobile clinic. This estimate, however, includes services performed in densely populated areas. In 1975, the cost per patient was approximately $22.50 (BCOA, Mobile Clinic Report, 1974 & 1975). This figure, surprisingly, is close to the cost of an examination by a practitioner in private practice, but does not take into account the capital cost of a van which is nearly $40,000. It is possible, therefore, that a mobile vision care clinic could operate on a grant or fee for service basis while also allowing for administrative costs, van maintenance, and a capital cost allowance.

Conversely the Ministry of Health of Ontario currently operate six mobile vans, five through the University of Waterloo programme and one operated by the Canadian National Institute for the Blind. (Copeman, 1977). The School of Optometry has assumed responsibility for the provision of the five mobile vans which it operates, two of which have been donated by Lions' Service Clubs. The vans are used all over Ontario...from the first of May until the end of August. These vans are used, not only to visit communities, but also to visit nursing homes and homes for the retarded. Each van has a staff of one optometrist and four optometry students and the itineraries are established following requests from communities, service clubs, Medical Officers of Health and Health and Welfare Canada. Remuneration for the services provided has, in the past, been on a fee-for-service basis but this is being changed to a contractual arrangement with the Ministry of Health.(Copeman, 1977). The C.N.I.B. van is staffed by an ophthalmologist on a rotating basis from ophthalmologists in private practice, and ophthalmic nurses or ophthalmic assistants are also employed (up to two). The itinerary of the van is arranged similarily to the Waterloo vans. The C.N.I.B. van is used all year round, being in northern Ontario from April to November and in Southern Ontario (for glaucoma clinics and visiting old people's homes) during the winter. "Wherever the van is used, in addition to visual assessment, it is used as a centre of education. There is a slide show for patients to watch while they are in the waiting room which tells them about the healthy eye, signs to look for in the presence of eye disease. During the course of its travels throughout the Province, the staff talks to service clubs, family practitioners and other interested people."(Copeman, 1977).

The C.N.I.B. in Newfoundland and Quebec operates units similar to the one described for the Province of Ontario.

The Province of British Columbia should continue to consider the use of mobile vans, in the light of the experience in Ontario and other provinces.

Due to the regional maldistribution of vision care practitioners in British Columbia, and the small size of communities which may prohibit the development of satellite practices, there is need for the development of some alternative way of providing these communities with vision care services. There are, further, many institutions which have patients who are not ambulatory, or for other reasons are not able to get to a private practitioner's office. Although the need has not been documented for such services in all of these locations, it appears clear that if equality of access is a policy governing British Columbia's health service system, then access to examination and treatment should be provided in institutional and remote areas. The mobile van is one convenient way of providing these services.

From the accounts of the demonstration projects carried out in the province in 1974 and 1975, it is possible that the van could operate on a budget which, apart from the capital cost of the van, would be very competative with the cost of providing the service through other means. The most efficient use of the van would be realized if the programmes were administered and directed from Public Health Programs.

C. The Queen Charlotte Islands Eye Study

A project termed the "Combined Ophthalmology-Optometry Comprehensive Eye Care Programme" was initiated July 1st, 1975 under the jurisdiction of the Minister of Health of the Province of British Columbia. A group of three persons, an ophthalmologist, an optometrist and a dispensing optician, were appointed by their respective organizations to work as a team in this important demonstration of inter-professional activity. This team agreed to visit the Queen Charlotte City General Hospital about three times a year from September 1975, and the final report has been received by the Vision Care Task Force.

An important principle was accepted by the College of Physicians and Surgeons of British Columbia permitting direct referral from the optometrist to the ophthalmologist involved in this project. Professional judgment was used for these referrals which worked in both directions. Advance notice is given in a periodic newsletter distributed throughout the Islands, prior to the visit of the team, and a clinic nurse arranges the appointments, generally allocating younger patients to the optometrist and middle-aged and older patients to the ophthalmologist. Thus, both the optometrist and the ophthalmologist provided primary vision care. Transfer of visual findings to the medical records of the hospital conveys information to the hospital personnel and assures continuity at subsequent visits. (Elliot, 1977)

The present financing for the clinic is on a tenuous fee-for-service basis. The team need five working days, including one day each for its own transportation and the setting up of equipment, and three working days in the clinic facilities. The equipment is stored at the Queen Charlotte City Hospital. The dispensing optician operated on his Vancouver retail base.

The professionals involved in the programme have noted that the fees do not take into account the travelling time, though it must be said that they have chosen to operate on a fee-for-service basis rather than a sessional fee.

The Vision Care Task Force has noted that this is a unique demonstration project, involving the full participation of the three disciplines under the overall aegis of the Ministry of Health. Unfortunately the cost of travel, previously born by a private fund, now must be carried by the project. There do not appear to be resources budgeted for this type of programme within the Ministry of Human Resources (which operates a Health and Human Resource Centre on the Islands) or within the Ministry of Health.

D. Low Vision Clinic

The first and only low vision clinic in B.C. was started in the Outpatient Department of Vancouver General Hospital in 1958. The clinic was moved from V.G.H. to the University of British Columbia in 1962, where it has continued to function from that time to the present. During this period of 19 years approximately 5000 patients have been examined.

The clinic is currently handling six patients per week and there is a waiting period of about eight weeks before a patient can be examined. These patients come from all parts of the province and are accepted only on the basis of referrals from medical practitioners. While the eight week waiting period may appear to be long, in almost all cases this length of time does not entail an unacceptable deterioration in the conditions affecting the patients. If considered essential in emergency cases, arrangements can be made to provide an examination in a very short time.

In addition to acting as a treatment centre for persons with low vision, the clinic also offers a counselling service for the visually impaired covering genetic advice, psychiatric help, aid to be obtained through the C.N.I.B., and other specialty services such as diabetic and retinal clinics, etc.

E. Other Demonstrations

A number of other models exist but are not well documented. At Fort St. John, B.C., three residents practice individually in a clinic for two week periods twice during their training programme, under the supervision of praeceptors at Prince George in the ophthalmological residency programme of the University of British Columbia. These residents use the hospital facility and equipment at Fort St. John.

At Williams Lake an ophthalmologist visits the area and works directly out of an optometrist's office.

The Vision Care Task Force therefore concludes that there is no single model for vision care delivery which can be applied in every situation. Obviously the ability of patients to move freely back and forth between all disciplines in the system, on the basis of proper professional referrals, is the key to most of the models studied.

As a consequence of the above, the Vision Care Task Force makes the following recommendation:

> Recommendation 8: THAT A VISION CARE PROGRAMME, INCORPORATING A VARIETY OF MODELS BE ESTABLISHED BY THE GOVERNMENT OF THE PROVINCE OF BRITISH COLUMBIA, TAKING INTO ACCOUNT THE FOLLOWING PRINCIPLES:
>
> a. THE PARTICULAR MODEL SHOULD VARY WITH THE COMMUNITY OR REGIONAL VISION CARE MANPOWER REQUIREMENTS.
>
> b. IN GENERAL, THE EMPHASIS SHOULD BE PLACED UPON PROVIDING CARE BY MEANS OF VISITING VISION CARE PERSONNEL AT A CENTRAL LOCATION IN RURAL AREAS. PRIORITIES SHOULD BE GIVEN TO AREAS WITH NO REGULAR EYE CARE AND WHICH ARE LOCATED A MINIMUM OF FORTY MILES FROM CENTRES WITH EYE CARE. THE CHOICE OF LOCATION IS AFFECTED BY THE SURROUNDING CATCHMENT AREA.
>
> c. VISION CARE SERVICES SHOULD BE PLANNED AND ORGANIZED BY THE GOVERNMENT WITH THE COOPERATION OF THE FOUR GROUPS--PHYSICIANS AND/OR

OPHTHALMOLOGISTS, OPTOMETRISTS, DISPENSING OPTICIANS, OTHER RELATED HEALTH PERSONNEL, AND SHOULD BE COORDINATED:

i. TO VISIT COMMUNITIES REGULARLY AND USUALLY FOR AT LEAST A THREE-DAY PERIOD;

ii. TO INCORPORATE THOSE PHYSICIANS OR OPTOMETRISTS WHO HAVE ALREADY ESTABLISHED SATELLITE PRACTICES.

iii. WITH THE SCREENING ACTIVITIES AND PROFESSIONAL SERVICES IN THE COMMUNITY. FOR EXAMPLE, VISITS MIGHT BE RELATED WITH THE SCHOOL TESTING PROGRAMME.

d. PAYMENT FORMULAE OF PROFESSIONALS AND OTHER PERSONNEL SHOULD TAKE INTO ACCOUNT THE EXISTING AVERAGE OVERHEADS IN PRACTITIONERS OFFICES. POSSIBLE FORMULAE INCLUDE PAYMENT OF A SESSIONAL FEE, SALARY, OR CONTRACTUAL ARRANGEMENTS FOR THE ENTIRE WORKING AND TRAVEL TIME USED.

e. THE COMMUNITIES SHOULD BE RESPONSIBLE FOR HOUSING AND STORING OF EQUIPMENT AND THE NECESSARY PUBLICITY AND ADVANCE APPOINTMENT SYSTEM. MUCH OF THIS SHOULD BE DONE THROUGH

COMMUNITY PUBLIC HEALTH UNITS. OTHER SERVICE ORGANIZATIONS SUCH AS THE LIONS CLUB, AND THE CNIB MIGHT ALSO BECOME INVOLVED.

It has been noted that most equipment is portable, but must be moved carefully. The transportation of equipment in vans, or in a truck is possible, but requires special coordination to ensure that it is on site for the professional visits. Therefore it is further recommended:-

> Recommendation 9: THAT EXISTING FACILITIES, STENOGRAPHIC AND SUPPORT SERVICES USED BY HOSPITALS, OPTOMETRISTS, PHYSICIANS OR CLINICS BE USED WHERE EVER POSSIBLE BY TRAVELLING CLINICS, AND ADEQUATE COMPENSATION FOR THEIR USE BE PROVIDED BY THE GOVERNMENT.

It is likely that there will be considerable turnover of visiting vision care personnel. Therefore, adequate records are essential. It is therefore recommended:-

> Recommendation 10: THAT A BASIC CHART BE CREATED UPON WHICH PATIENT INFORMATION CAN BE RECORDED AND KEPT IN AN OFFICIAL COMMUNITY FACILITY SUCH AS THE COMMUNITY HOSPITAL OR HEALTH UNIT.

The Vision Care Task Force believes that coordination requires direct and specific governmental action.

Recommendation 11: THAT THE PLANNING AND COORDINATION OF THE VISION CARE PROGRAMME BE ASSIGNED TO COMMUNITY HEALTH PROGRAMMES OF THE MINISTRY OF HEALTH.

It is felt by the Vision Care Task Force that the success of any coordination is contingent upon the involvement of the Provincial Government. It is not practical to merely encourage the ophthalmologists and optometrists to provide the care in underserviced areas since these groups have no power over their members. The need for vision care in a community is best identified through the public health programmes of the province. It is therefore implied by these recommendations that the Government must take the initiative to establish the services, though it will have to depend upon the private sector for the professional services required. In the opinion of the Task Force it is essential that the professional associations involved in vision care be also involved in the initiation of the above services by the government.

REQUIREMENTS FOR VISION CARE PERSONNEL

A proper vision care system must be based upon determining the population needs, translating these needs into activities, determining the competencies required to perform these activities, packaging the competencies into groups based upon required knowledge, and packaging the groups into various functional roles. An example of this was the recent Children's Dental Health Research Project carried out jointly by the Ministry of Health and the College of Dental Surgeons of British Columbia, (Ministry of Health, 1975).

This report has already examined the existing system. Estimates of needed annual "refractive services" to 1991 have been prepared (Table 33). What will be the likely productivity of the existing personnel? If that productivity can be determined, some estimates may be made of the numbers of vision care personnel required.

The manpower studied in Table 15 are not all engaged in full-time practice. While the calculation of FTEs adjusts for this, the study of productivity of refractive services really requires a denominator restricted to practicing manpower which has not been possible to obtain.

Preliminary examinations were made of all ophthalmologists and optometrists who billed the Medical Services Plan for more than 50 refractive services since 1972. Attention was directed to refractions only, i.e. to fee code 2015 for ophthalmologists and 2899 for optometrists. Thus consultations performed by ophthalmologists have been excluded from this analysis. The mean productivity is shown by age group and for certain broad regions of the province in Table 36. The productivity (of refractive services only) of both groups has increased steadily since 1972, being now about 1795 refractive services per year for each ophthalmologist and 1400 for each optometrist.

Table 36 indicates that the most productive (of refractive services) is the older ophthalmologist (55 years of age or older), who now performs more than 2000 services per year. Younger optometrists are the least productive (1331 services per year in 1976). The data conform to the widely held belief that ophthalmologists reduce the surgical component of their practice as they reach retirement age; and that young optometrists have difficulty starting out in practice and building up their clientele. Ophthalmologists are most productive in the Capital Regional district (over 2200 refractive services per year); significantly, optometrists are least productive in the same region (less than 1250 services per year in 1976).

Statistics have also been collected on the in-migration and attrition of ophthalmologists and optometrists, so that it is possible to model the changes in optometric and ophthalmological manpower stock each year to 1991 under certain specified conditions. The overall model for projecting the stock is shown

Table 36: Mean Number of Refractive Services by Age Classes, Performed by Optometrists and Ophthalmologists*, 1972-1976

	Year				
	1972	1973	1974	1975	1976
A. Ophthalmologists					
Total	1247	1277	1468	1632	1795
25 - 34 years	728	1017	1145	1212	1653
35 - 44 years	1062	1254	1481	1589	1602
45 - 54 years	1492	1495	1616	1848	1857
55+ years	1327	1136	1354	1570	2014
Unknown	-	-	-	-	-
Greater Vancouver	1132	1194	1357	1589	1714
Capital Region	1642	1677	1846	1970	2241
All Other	1293	1267	1515	1553	1755
B. Optometrists					
Total	1015	1050	1150	1257	1400
25 - 34 years	1115	1036	1153	1093	1331
35 - 44 years	1035	1110	1272	1472	1479
45 - 54 years	1051	1134	1226	1370	1535
55+ years	961	990	1085	1257	1402
Unknown	834	726	775	759	759
Greater Vancouver	982	1020	1145	1244	1339
Capital Region	788	827	914	1038	1241
All Other	1103	1138	1193	1317	1494

---

* For those billing for more than 50 services per year:
Ophthalmologists = #2015 Fee Code
Optometrists = #2899 Fee Code

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in Fig. 13. Certain assumptions[1] are made in this model:

a. In-migration

Table 37 shows the actual increase in the stock of optometrists and ophthalmologists for the period 1972 to 1976. It is assumed that this will continue as a fixed number in the foreseeable future. The number will certainly not increase: the Waterloo School of Optometry has reduced the enrolment of B.C. residents and the Department of Ophthalmology has no plans to increase the production of ophthalmological residents. Thus, the immigration is not likely to rise either as a projection of past flows or as a fixed ratio to the population.

In total, approximately seven ophthalmologists and six optometrists are registered for the first time each year in this province. Their age grouping is given in Table 37.

b. Ageing Effects

It is assumed that persons in a given age group are equally divided over the years contained within that age group. Thus, for example, of the fifteen ophthalmologists in the age group 30 - 34, three will be 30, three will be 31, etc., and three 34 years of age. Therefore, three will shift up into the next age group each year.

---

[1] Conclusions based on these assumptions may have to be modified as further information becomes available.

FIGURE 13: Model to Calculate Manpower Stock of Age x on a Specific Date t_1

Stock of age x at time t_1	=	Stock of age x at time t	+	Extra-provincial inflow expected t_1-t	+	Inflow of stock younger than age x becoming age x at t_1-t	-	Extra-provincial outflow expected t_1-t	-	Outflow of stock becoming older than age x at t_1-t
New Stock	=	Initial Stock	+	In-migration	+	Aged In	-	Out-migration	-	Aged Out

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Table 37: Experience of Growth of Optometrists and Ophthalmologists in British Columbia during the period 1972 - 1976

	Stock in 1972	Stock in 1976	4 year period		Annual	
			inflow	outflow*	inflow	outflow*
Ophthalmologists:						
29 - 34⁎	2	15	13	0	3.25	0.00
35 - 54	66	77	15	4	3.75	1.00
55 - 64	22	22	1	1	0.25	0.25
Optometrists:						
24 - 34⁎	10	31	21	3	5.25	0.75
35 - 54	60	62	2	2	0.50	0.50
55 - 64	56	52	1	3	0.25	0.75

---

* excludes aging beyond 65.

⁎ age groups at the minimum likely at time of entering practice

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c. Out-migration

The actual loss by death, emigration, erasure from the register or failure to renew a license has been observed for the period 1972 to 1976 (Table 37). It is again assumed that this will continue as a fixed number in the foreseeable future. The out-flows are very small: in total, only 1.25 ophthalmologists and 2.00 optometrists are lost each year; their age groupings are also recorded in this table.

d. Retirement Age

It is assumed that retirement age will be 65 years. In actual fact, vision care personnel continue to provide care sometimes to a very senior age. It is necessary to include a portion of services provided by these overage persons and this is done by a ratio technique (see below).

The year by year projections of the supply of ophthalmologists and optometrists to 1991 is shown in Appendix V; the assumptions listed above were followed and projections were made for each of the three age groups and two professional groups separately. The results have been presented in Table 38; a net increase of 36 ophthalmologists is projected for 1991 (or 2.4 per year), and no increase of optometrists is projected for the same period. The actual recruitment of new registrants is, of course, greater than these numbers in order to result in these figures.

It now becomes necessary to examine the number of "refractive services" which will be generated by these manpower

Table 38: Ophthalmologists and Optometrists*
Current and Projected Stock by Age
1976, 1981, 1986, 1991

	Year			
	1976	1981	1986	1991
Ophthalmologists				
29 - 34	15	14	13	13
35 - 54	77	87	93	98
55 - 64	22	29	35	39
TOTAL	*114*	*130*	*141*	*150*
Optometrists				
24 - 34	31	36	40	42
35 - 54	62	63	65	68
55 - 64	52	41	35	32
TOTAL	*145*	*140*	*140*	*142*

---

* See Appendix V. Rounded to integers

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stocks, and compare that number with the required services projected in Table 35. The key variable studied by the Task Force was the productivity of the members of each group. The purpose of such study was to show the required optometric manpower in B.C. in the future under moderate and extreme circumstances, in relation to the need for a School of Optometry. Five cases were proposed:

Case I.

The existing age-specific productivity will persist until 1991;

Case II.

The productivity of ophthalmologists will remain unchanged until 1991, but optometrists will, by 1981, increase their productivity of "refractive services" to the maximum observed for an age group in 1976, which was 1535 services (attained by 45 - 54 year old optometrists);

Case III.

The productivity of ophthalmologists will remain unchanged until 1991, but optometrists will, in each age group, increase their productivity to pick up all surplus refractive services that are needed;

Case IV

The productivity of ophthalmologists will be reduced to 1000 in stages: for 29-34 year old ophthalmologists by 1981, for 29-54 year old ophthalmologists by 1986, and for all ophthalmologists by 1991. The existing age specific productivity of optometrists will persist unchanged from 1976 to 1991.

Case V.[1]

The productivity of ophthalmologists is maintained at present rates while ophthalmologic inflow is restricted to the present training program (U.B.C.) of 3 per year. Outflow is assumed to be 1.25 per year. Optometry increases their productivity to absorb the surplus in 1981, and will further increase productivity to an average of approximately 2000 (2024) examinations by the year 1986 with no further increase in subsequent years. Table 38A shows the manpower projections for optometrists and ophthalmologists under these assumptions.

---

[1] Case V has been suggested by the B.C. Optometric Association and represents what it feels is a reasonable and attainable plan.

Table 38A: OPHTHALMOLOGISTS AND OPTOMETRISTS*
CURRENT AND PROJECTED STOCK BY AGE
1976, 1981, 1986, 1991

	1976	1981	1986	1991
Ophthalmologists				
29 - 34	15	11	9	8
35 - 54	77	78	71	64
55 - 64	22	28	30	29
Total	114	117	110	101
Optometrists				
24 - 34	31	36	40	42
35 - 54	62	63	65	68
55 - 64	52	41	35	32
Total	145	140	140	142

---

*See Appendix V. Rounded to integers.

(The above figures are applicable to Case V only.)

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It will be immediately seen that Case IV is an extreme case: it assumes that one group will reduce productivity while the other will not increase productivity. Case III is the other extreme case: it assumes that optometrists will increase their productivity to pick up all unmet demand for "refractive services". Cases II and V represent a modest increase in optometric productivity. Case V, however, assumes a productivity increase to near 2000, whereas Case II assumes an increase to only 1535. The assumption in these cases is that it is optometry which should increase its refractive activity. The Vision Care Task Force, by this assumption, tested the maximum need for new optometrists, playing their existing role, and thus tested the need for a School of Optometry for the Province of British Columbia.

The actual productivities used in these cases are presented in Table 39. Case III is an interesting proposition: can optometrists increase their productivity of refractive services to 1718 by 1981, to 2050 by 1986, and to 2412 by 1991? If so, than no extra new vision care manpower is required by the Province. On the other hand, Case V suggests that optometrists increase their productivity of refractive services to 1851 by 1981 and 2024 by 1986. Although 2000 refractions seems more reasonable, both productivities do not seem impossible. A target of 2500 refractive services has been suggested, though this latter presupposes that optometrists will give up the dispensing of spectacles.

The stock of Table 38 and the productivity of that stock

Table 39: Conditions for Projection of Services Performed by the Stock of Optometrists and Ophthalmologists

	Case I	*Case II*	*Case III*			*Case IV*			*Case V*		
	Existing Productivity	Ophthalmologist productivity unchanged; Optometry at present productivity for age class 45 - 54 years.	Ophthalmologist productivity unchanged; Optometry productivity rises to pick up all surplus.			Ophthalmologists gradually reduce productivity to 1000. Optometry productivity remains unchanged.			Ophthalmologist productivity unchanged, and licensing restricted to three per year. Optometry productivity rises to 1851 by 1981, and 2024 by 1986.		
			1981	1986	1991	1981	1986	1991	1981	1986	1991
Ophthalmologists											
29-34	1650	1650	1650	1650	1650	1000	1000	1000	1650	1650	1650
35-54	1730	1730	1730	1730	1730	1730	1000	1000	1730	1730	1730
55-64	2010	2010	2010	2010	2010	2010	1730	1000	2010	2010	2010
Optometrists											
24-34	1330	1535	1718	2050	2412	1330	1330	1330	1724	1894	1894
35-54	1510	1535	1718	2050	2412	1510	1510	1510	1951	2128	2128
55-64	1402	1535	1718	2050	2412	1402	1402	1402	1812 \#	1979 *	1979 *

# The age specific productivities for optometrists in this column average 1851.

* The age specific productivities for optometrists in this column average 2024.

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for each case shown in Table 39 have been used in Table 40 where the total deficit in "refractive services" has been projected for each five year period to 1991. An additional supply of services by over-age practitioners is currently provided: this amounted to a ratio of 10.27% of the services provided by vision care persons under 65 years of age. The total services for each time period and each condition includes this component. It has therefore been assumed that the over-age practitioners will continue to provide refractive services at approximately 9% to 10% of the total.

The maximum deficit by 1991 will be 270,768 services for Case IV (where ophthalmologists reduce productivity); Case II (a small increase in optometrist's productivity) will result in a deficit of 123,066 services. These deficits are derived from the predicted number of required services shown in Table 35.

Table 40 is summarized in Table 41 and the requirements for additional required manpower (i.e., additional to the current growth), are estimated for 1981, 1986 and 1991. Table 42 expresses these requirements in terms of the annual recruitment of optometrists necessary for each five-year time period. It is presumed that recruitment of ophthalmologists will remain unchanged, except in Case V where it is held at three per year. Table 42 thus presents the best estimate of "need" for optometrists available to the Task Force. Only the current six per year are required if they can increase their productivity to 2124 "refractive services" per year by 1991 (Case III). If the ophthalmologists markedly reduce refractions while optometrists

Table 40: Projection of "Refractive Services" Performed, 1981 - 1991

			1981	1986	1991
Case I	Refractions:	Ophthalmology	231,900	252,690	269,380
		Optometry	200,492	200,420	203,404
		Subtotal	432,392	453,110	472,784
		Overage practitioners*	44,407	46,534	48,555
		Total	476,799	499,644	521,339
	Surplus *(deficit)¤*		(39,959)	(86,608)	(139,128)
Case II	Refractions:	Ophthalmology	231,900	252,690	269,380
		Optometry	214,900	214,900	217,970
		Subtotal	446,800	467,590	487,350
		Overage practitioners	45,886	48,021	50,051
		Total	492,686	515,611	537,401
	Surplus *(deficit)*		(24,072)	(70,641)	(123,066)
Case III	Refractions:	Ophthalmology	231,900	252,690	269,380
		Optometry	240,451	287,028	342,532
		Subtotal	472,351	539,718	611,912
		Overage practitioners	44,407	46,534	48,555
		Total	516,758	586,252	660,467
	Surplus *(deficit)*		(0)	(0)	(0)
Case IV	Refractions:	Ophthalmology	222,800	166,550	150,000
		Optometry	200,492	200,420	203,404
		Subtotal	423,292	366,970	353,404
		Overage practitioners	43,472	37,688	36,295
		Total	466,764	404,658	389,699
	Surplus *(deficit)*		(49,994)	(181,594)	(270,768)
Case V	Refractions:	Ophthalmology	209,370	197,980	182,210
		Optometry	259,260	283,345	287,580
		Overage*	48,128	49,432	48,247
		Total	516,758	530,757	518,037
	Surplus *(Deficit)*		(0)	(55,495)	(142,430)

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*Adjustment is in the ratio of 10.27% of services provided by optometrists and ophthalmologists under 65 years of age.
This remains unchanged in all cases.

¤Deficit for required refractive services in Table 35.

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Table 40a: Further Assumption to Case V*

Ophthalmologic Workload Decrease[1]	Services Deficit due to Workload Decrease	Optometric Manpower Replacement[2]	Optometric Manpower Deficit[3]	Total Deficit
10%	19,798	10	27	37
20%	39,596	20	27	47
25%	49,495	24	27	51
30%	59,394	29	27	56
40%	79,192	39	27	66

. . . .

ASSUMPTION: As noted above but extended to the 1991 data:

Ophthalmologic Workload Decrease[1]	Services Deficit due to Workload Decrease	Optometric Manpower Replacement[2]	Optometric Manpower Deficit[3]	Total Deficit
10%	18,221	9	70	79
20%	36,442	18	70	88
25%	45,552	23	70	93
30%	54,663	27	70	97
40%	72,884	36	70	106

. . . .

* By 1986 the ophthalmologist's refractive (2015) workload will decrease due to the demand for services other than 2015's (i.e. consultative services). The table below assumes various reductions (in percent) in ophthalmic refractive services and the subsequent optometric manpower that would be needed to compensate for the resultant deficit in services.

1. Workload decrease as a percentage of 1986 services by ophthalmologists.
2. Manpower replacement required if average optometrist replacement performs 2024 examinations.
3. Deficit refractions (1986) divided by average refractions (2024).

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Table 41: Deficit in Refractive Services and Additional Optometric Manpower Required Under Four Cases - 1981, 1986, 1991

	1981		1986		1991	
	Deficit	Man-power	Deficit	Man-power	Deficit	Man-power
Case I Existing productivity (avg. = 1510)	39,959	26.5	86,608	57.4	139,128	92.1
Case II Optometry productivity increased (to 1535)	24,072	15.7	70,641	46.0	123,066	80.2
Case III Optometry productivity increased to abolish surplus	0	0	0	0	0	0
Case IV Ophthalmologists reduce productivity (to 1000)	49,994	33.1	181,594	120.3	270,768	179.3
*Case v** Optometry productivity increases by 1986 (avg. = 2024)	-	-	55,495	27.4	142,430	70.4
*Case v** Assumption that Ophthalmology 2015 workload decreases by 10%.	-	-	75,293	37.2	160,651	79.4

*Manpower required is determined by dividing by the average number of examinations performed.

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Table 42: New Optometric Manpower Required Annually Under Five Cases and Three Time Periods

	1976 - 1981	1981 - 1986	1986 - 1991
Current recruitment	6	6	6
Excess recruitment			
Case I	5	6	7
Case II	3	6	7
Case III	0	0	0
Case IV	7	17	12
Case V	0	5	9
Case V (assumption 10%)	-	7	9
RANGE OF NEW OPTOMETRIC MANPOWER REQUIRED ANNUALLY	6 to 13	6 to 23	6 to 18

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do not increase their productivity (Case IV), only eighteen new optometrists will be required each year over the fifteen year time period. Case V requires only the current recruitment until 1981, but increases to fourteen per year for the period 1981 to 1991. Since six are already being recruited from elsewhere, this means that the maximum number to be trained under the worst possible projection is twelve optometrists per year.

Further, the conservative, but attainable Case II requires that only five be trained per year, in addition to the current recruitment of six per year from elsewhere. Case V, which is perhaps the most interesting of the cases and proposed by the optometrists, demands a higher productivity by optometrists (than Case II), while maintaining ophthalmologic recruitment at three per year. This case requires that only seven optometrists be trained per year in addition to the current recruitment of six per year. Table 40a (page 154) outlines a further assumption where due to an increased demand for consultative services, (as a consequence of a reduced ophthalmologic population) ophthalmologists will decrease their refractive workload. This deficit will be picked up by optometry. Given an ophthalmological decrease in refractive workload of 10%, Table 42 shows that on the average, one additional optometrist per year (over the period 1981 to 1991) is needed.

It is clear to the Task Force that there is not a sufficient requirement for new optometrists in British Columbia alone to justify a School of Optometry. How many of the needed six being presently recruited from elsewhere will continue to emigrate to B.C.? The arguments for or against the projections are easy to muster but, if B.C. is to be completely self-sufficient in vision care, somewhere between thirteen and eighteen optometrists per year must be recruited in B.C.

Fourteen positions have been purchased at the University of Waterloo School of Optometry by the provinces of Alberta, Saskatchewan and Manitoba. Joined with B.C.'s requirements, there is some justification for a school of twenty-five to thirty optometry students per year. But if the productivity of optometrists increases, or if optometrists continue to emigrate to B.C. from the rest of Canada and other areas, this school will result in an oversupply. An alternative which the Task Force has considered is to join these other provinces, and purchase a limited number of places at the University of Waterloo or other Schools of Optometry in the United States or elsewhere.[1]

While all of these cases are based on assumptions, it is important to note that we now have factual information on population on which to compare the B.C. Research Council estimates, made in 1971 for 1976, with the actual census figures for that year. The actual Canadian Census figure for the year 1971 for B.C. population is 2,184,232 and for the year 1976 is

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[1] A recent letter to the B.C. Optometric Association from the Dean of the School of Optometry at Waterloo has stated that the faculty is hesitant to re-negotiate their current contract with the western provinces which expires in 1981.

2,406,212. The population increase in B.C. over the five-year period has therefore been 221,980. On the other hand, the B.C. Research Council estimate for the 1976 B.C. population, made in 1971, is 2,469,929 or 63,717 more than actual. If the increase in future B.C. population is assumed to be the same as that shown in the period 1971 to 1976, rather than the more generous estimates of the B.C. Research Council used in all calculations for future needed refractions; then the requirements for future optometric manpower will be reduced.

For example, in Case V, future optometric manpower requirements would be changed from a total of 27.4 during the period 1981 to 1986 to a surplus, and instead of 70.4 being required from 1986 to 1991, only 24.4 would be required, or only 5 per year during this period.

The above example should be qualified, however, in that the basis used is a comparison of total actual population in 1976 vs. the predicted population for that year in the B.C. Research Council figures. The final 1976 Census figures, segregating the population by age, will not be available before the end of 1977. This age class distribution could affect the estimated requirements for optometric manpower as a result of proportionate increases in older age groups requiring more vision care than the younger age groups (table 32).

It is still necessary to examine whether the productivity estimates of Table 39 are feasible. In Table 43, a number of various estimates are reviewed and tested for feasibility.

Table 43: Estimates of Optometric Productivity (Visual Examinations Per Year)

46 work weeks/year* 7.5 hrs/day	Full time to Visual Examination	15% of time to CL※& other duties	20% of time to CL※& other duties	30% of time to CL※& other duties	40% of time to CL※& other duties
Total Minutes of Work Time for Visual Examination	103,500	87,975	82,800	72,450	62,100
Potential Productivity Based on:					
I Examination-Plus Dispensing & Delivery (Time 77.2 min)θ	1341	1139	1073	939	804
II Examination-Plus Frame Selection# (Time 41.4min)θ	2500	2125	2000	1750	1500
III Visual Examination only (Time 33.0 min)θ	3136	2666	2509	2196	1882

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* A 44 hour work week reduces available work time and therefore the number of examination by 4.4%

※ Contact Lenses work

θ Marg & Ng, 1972

# Because of the large difference in the availability and selection of spectacle frames now and five years ago the Task Force feels that frame selection is considerably more time consuming than is indicated in this study.

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Calculations are based upon a study by Marg and Ng (1972) which estimates the time in minutes for the various parts of the optometric examination. Potential work time is based on a 46-week work year at seven and one-half hours per day. Consideration is given to the proportion of this time that is spent in performing visual examinations, as opposed to rechecks and non-insured services such as contact lens therapy (CL), and binocular vision training. The tables produced by Marg and Ng make provision for varying degrees of direct dispensing responsibility by the optometrist.

Using these estimates, it appears that the current productivity of optometrists in this province is low in comparison with their potential productivity, and could, given an adequate supply of patients, be increased. A productivity of 2000 refractive examinations is seen to be quite feasible given that the optometrist spends 20% of his time in contact lens work. Even if the amount of contact lense work increases, and other duties also increase so that they occupy 30% of his time, if the optometrist will delegate certain activities such as dispensing and delivery of spectacles, it is reasonable to expect that his productivity would certainly rise to 1750 visual examinations per year if the demand was there. This is probably an underestimate.

In light of the above discussion and examination of five hypothetical cases, the Vision Care Task Force recommends:-

Recommendation 12. THAT THE GOVERNMENT OF BRITISH COLUMBIA REMAIN IN CONSULTATION WITH THE

MINISTERS OF HEALTH AND EDUCATION IN THE OTHER WESTERN PROVINCES AND CONSIDER ANY PROPOSAL FOR COOPERATION IN OPTOMETRIC EDUCATION. THIS IS IN VIEW OF THE OPINION OF THE TASK FORCE THAT THE NEED FOR A SEPARATE SCHOOL OF OPTOMETRY FOR BRITISH COLUMBIA ALONE CANNOT BE SUBSTANTIATED.

PRESCRIBING OF OPTICAL APPLIANCES

The Task Force has discussed the sale of optical appliances at great length. The Task Force has agreed unanimously with the following recommendation although it should be pointed out that it in no way prohibits or interfers with the use of the fee for service system of dispensing optical appliances used by some vision care practitioners. It is therefore recommended:-

> Recommendation 13. THAT THOSE WHO PRESCRIBE OPTICAL DEVICES SHOULD NOT PROFIT FROM THE SALE OF OPTICAL DEVICES.

AUTOMATED REFRACTION DEVICES

A major concern when projecting future requirements for vision care personnel is the likely impact of new technology in increasing the productivity of persons doing refractions.

Automated refraction devices are electronic instruments which objectively determine the refractive state of the eye. The automated refractor was first marketed in North America in the early 1970's, primarily for the purpose of mass screening, and as a substitute for retinoscopy (the measurement of refractive error).

The visual examination has been defined (BCMA, 1977) as that act which includes a general medical and ophthalmic history, pupillary reactions, measurement of refractive error, ophthalmoscopy, biomicroscopy, tonometry, ocular muscle balance, keratometry, visual fields, diagnosis and treatment. The autorefractors, therefore, can only be used as a substitute for one component of the visual examination. Two Canadian studies (Dyson, 1977; Drance _et al_, 1975), have examined the findings of these objective devices compared to concurrent subjective examinations on the same patients. Table 44 shows the correlations that were obtained between objective and subjective sphere, cylinder, and axis results for varying numbers of patients. The table shows also the percentage of eyes where the objective and subjective sphere and cylinder findings are within plus or minus 0.25 diopters, which is greater than the clinical tolerance for refractive measurement, generally accepted as 0.12

Table 44: Correlations of Sphere, Cylinder and Axis Results between Automated Objective and Subjective Refraction Techniques, with the Proportion of Results within ± 0.25 Diopters or ± 5^0 Axis

	Drance, 1975 Dioptron		Dyson Autorefractor	
	Correlation (Pearson r)*	7% within ± 0.25 D	Correlation (Pearson r)*	7% within ± 0.25 D
Sphere	.96	40%	.97	51%
Cylinder	.76	66%	.84	53%
Axis	.73	33%	.83	35%

* Pearson r is a correlation statistic. It is a measure of association indicating the strength of the linear relationship between two variables. In this case the two key variables are objective refraction and subjective refraction. A perfectly linear relationship is found as r approaches 1.00.

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diopters. The proportion of eyes where the cylinder axis findings were within plus or minus 5 degrees is shown also. Although correlations are quite high, a relatively small and perhaps clinically unacceptable proportion of the subjective and objective findings come within plus or minus 0.25 diopters, and even lesser numbers of cylinder axis results are within the 5 degree limits.

Dyson (1977) concludes, on the basis of "reasonably close" parallelism between findings, that his study shows good agreement in general, between refractive determinations by clinicians and by the autorefractor.

Drance et al (1975) found that the Dioptron (R) seemed to give reproducible readings. They point out, however, that the rejection rate was high and whenever the pupil was small, the clarity of the media was disturbed, or there was difficulty in fixation (i.e., in young children, hyperactive and mentally retarded persons), refraction was difficult or not possible. Visual acuities obtained with the prescription printed by the automatic refraction machine as compared with the subjective refraction was lower by two lines or worse in 27% of the cases, while only 32% had the same acuity. The authors conclude that further technical development and research into the means by which the machine can be used to provide an objective basis for refraction will have to be undertaken.

In the area of visual screening, Woodruff (1977) has completed a study comparing the results of the modified clinical screening technique[1] (MCT) and automated refractor findings among school children in Ontario. The author provides an epidemiological assessment of the autorefractor as a screening device, using the results of the MCT as a diagnostic base. These results are shown in Table 45. Table 46 shows the correlations between the retinoscopic and automated refractor results. Woodruff points out that a consideration of the pass-fail rates established for the two autorefractors studied, as compared to the MCT examination, suggests that these instruments grossly over-refer. The author illustrates that the extent of the prevalence of pathological conditions, strabismus, heterophorias, and refractive differences between the eyes, also mitigates against their use. He concludes that autorefractors, used as screening devices, would not be reliable or cost-effective.

The benefits to vision care manpower productivity, through the use of automated refractors, was not discussed in the three studies outlined. It seems there are possible productivity benefits in mass screening, although these may be offset by high over-referral rates. The device is limited in that it gives a detailed assessment of the refractive state, which is not necessary in mass screening, and serves no other function.

Table 47 shows, in columns one to three, the time necessary

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[1] A screening by optometrists which includes visual acuity, muscle balance tests, retinoscopy, and internal and external ocular examination.

Table 45: Epidemiological Assessment of Screening with the Dioptron and Model 6600 Automated Refractors, as compared to the Modified Clinical Technique

	Diopton n=403	Acuity Systems 6600 n=722
Sensitivity	85.5%	94.8%
False Negatives (Under referrals)	14.5%	5.2%
Specificity	87.1%	43.5%
False Positives (Over referrals)	12.9%	56.5%
Positive Predictive Value of the Test	57.8%	34.6%
Negative Predictive Value of the Test	96.7%	96.3%

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Table 46: Correlations of Sphere, Cylinder, and Axis Results between Automated Objective and Subjective Refraction Techniques

(Using the Pearson r correlation coefficient)*

	Dioptron	Acuity Systems 6600
Sphere	.76	.53
Cylinder	.23	.41
Axis	.13	.05

* Please see Table 44 for the explanation of Pearson r.

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Table 47: SUMMARY SHEET ON AUTOMATED REFRACTORS - October, 1976

	OBJECTIVE REFRACTORS			SUBJECTIVE REFRACTORS	
FEATURE	SAFIR OPHTHALMETRON Bausch & Lomb 1400 N. Goodman Street Rochester, N.Y. 14602	6600 AUTO-REFRACTOR Acuity Systems Inc. 11413 Isaac Newton Sq. Reston, VA 22090	DIOPTRON Coherent Medical 3210 Porter Drive Palo Alto, CA 94304	VISION ANALYZER Humphrey Instruments Inc. 2800 Seventh Street Berkeley, CA 94710	SR III SUBJECTIVE REFRACTION SYSTEM American Optical Corp. Box I Southbridge, MA 01550
Purchase price (incl. inst. table)	$ 16,500	$ 24,800 ($ 26,800 with printer)	$ 22,900	$ 22,500	To be announced
Number in use (best estimate)	50 - 150	700 - 900	200 - 300	30 - 40	Just announced
Intended purpose	Preliminary refraction	Preliminary refraction	Preliminary refraction	Total refraction, replacing the refractor and trial frame	Preliminary refraction, plus visual acuity
Intended operator	Technician	Technician	Technician	Practitioner or advanced technician	Technician
Visual acuity determined?	No visual acuity	No visual acuity	No visual acuity	Visual acuity determined	Visual acuity determined
Level of patient cooperation required	Must be able to hold still and fixate a target.	Must be able to hold still and fixate a target.	Must be able to hold still and fixate a target.	Must be able to focus a target by turning a knob.	Must be able to focus a target by turning a knob.
Minimum recommended pupil size	3 mm.	2.5 mm.	2.0 - 2.5 mm.	Any size	Any size
Required clarity of optical media	"Anything you can retinoscope"	At least 20/60 or 20/70 media, depending on nature of opacity.	At least 20/60 or 20/70 media, depending on nature of opacity.	20/50 or better allows best accuracy. Patients with poorer vision may focus acuity chart for best sphere.	20/50 or better allows best accuracy. Patients with poorer vision may focus acuity chart for best sphere.
Basic operating principle	Retinoscopy principle. Infrared light filtered from incandescent source. Instrument senses "with" or "against" motion of light reflex from fundus and seeks neutralization in each meridian as it scans 180°.	Scheiner principle. (double pinhole principle). Infrared light from LED's in quadrant configuration. Instrument nulls on one principal meridian, measuring its orientation and refractive correction. Error signal (open loop) in other principal meridian gives value of cylinder.	"Image analysis" principle. Infrared light filtered from incandescent source. Instrument finds best focus in an arbitrary meridian, scans 180° for peaks then measures successively in six meridians. Computer then calculates the refraction by fitting a sin curve to the dix-data points.	Patient focuses a series of fixed-orientation line targets, adjusting in succession: sphere, variable cross cylinder axes 90 and 180, sphere, variable cross cylinder axes 45 and 135. Computer converts these adjustments to sphere, cylinder, and axis notation. Final sphere is determined by fogging or by duochrome chart. Instrument also provides for "near" vision, phoria and other binocular testing.	Patient focuses or aligns a sequence of special jagged-line targets, adjusting in succession sphere, axis, sphere, cylinder. Final sphere is determined by fogging, using a visual acuity chart.
Monocular or binocular refraction possible	Monocular	Monocular	Monocular	Binocular	Monocular
Actual measurement time per eye	3 seconds/tracing; repeat if artifact appears on graph.	1.5 second; repetition advised to check consistency	20 seconds	variable	variable
Total time per patient (average	2 - 8 minutes	1.5 - 5 minutes	1.5 - 5 minutes	variable 5 minutes	variable
Accuracy	Reliable data are still unavailable for comparision of one objective refractor with another. Most practitioners find these instruments useful and worth the investment but hesitate to prescribe directly from the findings. Very roughly, the instruments all give about the same results compared to refined subjective refractions: Sphere: 2/3 within ± 0.25 D Cyl. : 2/3 within ± 0.25 D Axis : 2/3 within ± 5° (for cyl. over 0.50 D) (Better results are claimed by one company or another, but without reliable published data.)			Claims of high accuracy, but reliable data are not yet available.	

Source: David L. Guyton, M.D., The Wilmer Ophthalmological Institute, Johns Hopkins Hospital, Baltimore, MD 21205

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to perform an autorefraction with various instruments. In the visual examination it is uncertain as to whether the set-up and refraction with the objective device would take less time than retinoscopy and a subjective examination. Dyson (1977) states that the instrument could facilitate the task of refraction, but its findings would have to be regarded as preliminary and requiring further refinement. The work of Marg and Ng (1972), compared with the times established in Table 47, shows, however, that the use of the autorefractor as a substitute for retinoscopy, would not be time efficient.

Sufficient scientific rationale for the use of the objective automated refractor in screening or the clinical setting, has not been well established. It does not appear that manpower productivity would be facilitated by these devices. Recently, however, subjective automated refractors have been developed. Table 47 shows selected features of these devices in comparison to the objective refractors. One device, the Humphrey Vision Analyzer (R) facilitates most tests for binocular functions. Little data has been collected on these instruments, but some improvement to productivity through their use has been suggested.

The Vision Care Task Force believes that further research on the subjective refractors is now needed and that it is too soon to examine the impact which these will have upon the requirements for Vision Care personnel.

A PLAN FOR A COORDINATED VISION CARE SYSTEM

The instruction from the Minister of Health to the Task Force specifically states that the Task Force should develop an overall plan for a coordinated vision care system starting immediately, to be implemented over the next ten to fifteen years. All the material presented in the report to this point has been prepared in order to have available as much statistical information as possible on which to base recommendations for such a system. The Task Force has found that some information, which was considered to be helpful, was not obtainable and could not be developed. Other information, particularly in the prediction of future population trends and vision care needs, had to be based upon estimates and speculation. Nevertheless, the Task Force is prepared to suggest a plan for the future, based upon such information as it has been able to develop.

THE PRESENT SYSTEM

In examining the present system, the Task Force has concluded that, generally speaking, the present system is performing adequately. There are, however, several shortcomings in it. For example:

a) Certain areas of the Province, particularly in outlying regions and regions suffering from lack of adequate transportation facilities, are inadequately served.

b) The use of travelling clinics, which

apparently have proved their usefulness in some other provinces, are not being used to the extent they could be in British Columbia.

c) The present referral system between professionals in the vision care system is not working as well as it should be.

d) Any Act or Regulation governing the qualifications and performance of dispensing opticians is notable by its absence.

e) The workload of optometrists in British Columbia appears to be, on the average, lower than that found in other provinces.

f) The billings of ophthalmologists to MSC for "refractions" appears to be high in view of the specialized and intensive training they receive in more sophisticated areas of eye care (pathology and surgery).

A FUTURE SYSTEM

Any vision care system proposed for the future must take into account and try to improve or eliminate the shortcomings found in th present system and, at the same time, improve the efficiency of vision care delivery, all at the lowest possible cost to the people of British Columbia.

In proposing a timetable for the implementation of the future system, the Task Force has chosen more or less arbitrary time periods in which certain matters should be accomplished. It has also decided that any "look into the future" should be confined to the minimum period set in the terms of reference, namely, ten years. It considers that predicting conditions beyond the year 1987 would be so highly speculative and inaccurate as to be useless.

1. Accomplishments During Year One (End of 1978)

The first and most pressing problem is the enactment of legislation governing dispensing opticians in the Province. (Recommendations #5, #6 and #7)

2. Accomplishments During Year Two (End of 1979)

While it would be desirable that the matters under this heading were accomplished in Year One, nevertheless it is felt that they will require a longer period to implement. Therefore, it is suggested that:

a) The establishment of travelling clinics incorporating the required vision care personnel under the control of a Government Agency be undertaken as soon as possible, but in any case by the end of 1979. (Recommendations #8,#9 and #10)

b) The changes in the Medical Services Act and Optometry Acts be accomplished during this period. (Recommendations #1,#2,#3 and #4)

3. Accomplishments by the end of Year Five (End of 1982)

The farther into the future one gazes, the more difficult it is to make accurate predictions. For example, all of the Task Force estimates for B.C. population of the future, by Regional District, are those developed by the B.C. Research Council in 1971, yet their predictions for the year 1976 are found to be 63,717 greater that those shown by the preliminary figures resulting from the Dominion Census for that year (2,469,929 v.s. 2,406,212). If this trend continues in the future, then the Task Force predictions for future population will be somewhat higher than the actual population; hence the predictions for vision care services could be higher than they actually turn out to be; hence our predictions for manpower requirements to service this demand would also be higher.

In spite of these shortcomings, and in spite of the gross assumptions made in developing manpower requirements under theoretical Case Numbers I, II, III, IV and V, the Task Force is prepared to make certain general suggestions about what should be attempted during this five-year period, namely:

a) That the productivity of optometrists be increased to about 1,850 refractions per year in order to take care of the increased demand for primary vision care for the increased population.

b) That the productivity of ophthalmologists during this period remain approximately the same as it is today.

These two suggestions are easier made than implemented. The Task

Force realizes there is no way to accomplish this through any legislative process. The only possible means whereby such a result could be obtained is through whole-hearted cooperation between the two professions with this end in view. It remains to be seen whether or not this can be accomplished.

The justification for making these suggestions lies in the fact that the services of optometrists in B.C. appear to be under-utilized at present, and in the fact that optometrists in other provinces are currently more productive on the average than in B.C. A suggestion to help increase optometric productivity would be to encourage referrals from general practitioners to optometrists where no pathological condition or conditions requiring surgery are indicated. The Government could also implement a programme whereby a yearly monitoring system is set up to determine the progress being made, through the inter-referral system recommended and the cooperation of the two professions, to accomplish this five-year goal. If this goal of encouraging referrals from general practitioners to optometrists is to be accomplished within five years, a program should be initiated as soon as possible, preferably in year one.

4. Accomplishments by Year Ten (End of 1987)

By the end of this period, further progress should be made in developing the capacity of optometrists to perform a greater number of physiological examinations per practitioner, perhaps between 2,100 and 2,400 per year. It is recognized that this may necessitate the relinquishing of most of an optometist's dispensing activities but, if good will has been established between ophthalmologists, optometrists and qualified dispensing opticians, the prerequisite for reaching this goal will have been attained.

The Task Force has developed many statistics and made many guesses with regard to future professional personnel required to adequately serve the growing population of the province, with the objective of recommending what should be done about the training of future professional vision care manpower to serve the public. After development of the five theoretical cases discussed previously, in order to estimate the added yearly optometric manpower required, it has come to the conclusion that the establishment of a School of Optometry in British Columbia, or in one of the other three Western provinces, should be a subject of periodic discussions between the Ministers of Health and Education of the four Western provinces, based on continuing trends of optometric manpower supply and the need for such vision care by the ever-changing population of the area. (Recommendation #12)

SUMMARY

In summary, the timetable for the establishment of a more effective vision care system would be as follows.

a) Year One: Enactment of legislation governing dispensing opticianry in B.C.

b) Year Two: Amendments to the Medical Services Act and the Optometry Act. A system of travelling vision care clinics established.

c) First Five-Year Period: Increase optometric productivity to 1,850 examinations per year per optometrist.

d) Second Five-Year Period: Increase optometric productivity to 2,100 to 2,400 examinations per year, with necessary reductions in dispensing activities to be absorbed by qualified dispensing opticians, and with concomitant increase in direct referrals from optometrists to ophthalmologists where pathological problems are suspected.

e) Continuing Dialogue between the four Western Provinces in order to determine, in light of up-to-date information, the necessity or otherwise of establishing a Western School of Optometry to meet the needs of the Western Canadian population.

CONCLUSION

Throughout the deliberations of the Vision Care Task Force, it has been the objective to adhere to the terms of reference set forth for it. In one respect, however, the Task Force feels that it has not responded adequately to the directive contained in item 2 of the Terms of Reference, which states:- "To describe the training arrangements and numbers of different types of personnel required for the system proposed.

We have gone to some detail in describing the present training arrangements for vision care personnel. By and large these present training arrangements have been accepted as adequate for the job at hand, with the exception of the training for dispensing opticians, for which details are proposed to be incorporated in any forthcoming Dispensing Opticians Act (Recommendation #5).

The question of numbers, however, has not been answered. There are two main reasons for this:-

1. The Task Force has not been able to propose any new system of vision care for the Province, but rather has proposed a modification of the present system, such as the freeing of the present referral arrangements and the increase in productivity of the optometrists. If all the recommendations made in our report can be implemented the Task Force believes that out of them will evolve an efficient and viable system of vision care for the population. Sufficient time should be allowed to accomplish this objective.

2. Inasmuch as we have not proposed a completely new system for vision care in British Columbia, it was felt that the requirement for the number of vision care personnel to be specified in a new system was not possible to state. We have examined the present and projected numbers of the principle suppliers of vision care and have concluded that increases in any branch of the professions, opticians, para-medical and para-optometric personnel should be left in the capable hands of those already supplying the need for these people to meet the present and future requirements of the population. We have, however, pointed out the need for adjustment of these personnel in order to attain a more equitable distribution of services to the people, particularly in outlying areas.

We conclude this report with the hope that out of it will come closer and more understanding relations between all the disciplines involved in vision care in the Province of British Columbia to the ultimate benefit of the populace.

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GLOSSARY OF TERMS

ACCOMMODATION - The adjustment of the eye for seeing at different distances.

BIOMICROSCOPY - The examination of the cornea or lens of the eye by a combination of slit lamp and corneal microscope. (Instrument - biomicroscope.)

DIOPTER - The metric unit used to designate the focal power of an optical system. The power of a lens in diopters is equal to the reciprocal of the focal length in meters.

FUNCTION - The normal action or purpose of an organ or any other part of the body.

FUNCTIONAL - Pertaining to the activity (as of an organ) rather than the structure,as a "functional" disorder of the stomach, one in which only the activity is impaired (as opposed to an ulcer for example which constitutes a structural change).

FUSION - The ability to blend two similar images and localize them in space as one.

HETERO(PHORIA) - Failure of the visual axes to remain parallel.

KERATOMETRY - The measurement of the anterior curvature of the cornea. (Instrument - keratometer.)

MUSCLE BALANCE TESTS - Tests which measure the ability or failure of the eyes to remain parallel.

OCULOMOTOR - Actions which pertain to or affect movements of the eye.

OPHTHALMOSCOPY - The examination of the interior of the eye, particularly the retina and associated structures. (Instrument - ophthalmoscope.)

ORTHOPTICS - A process of learning or re-learning to use the two eyes together comfortably and efficiently, including the measurement of ocular muscle balance.

OVER-REFRACTION - The measurement of refractive error with a contact lens in place, i.e. the measurement of the residual refractive error not compensated for by the contact lens.

GLOSSARY OF TERMS (continued)

PARAMEDICAL - A person having some connection with, or relation to, the science or practice of medicine.

REFRACTIVE ERROR - A defect in the eye that prevents light rays from being brought to a single focus on the retina.

REFRACTOMETRY - The measurement of refractive error.

RETINOSCOPY - An objective method for measuring the refractive error of the eyes.

SPECTACLES - Commonly called glasses, but composed of lenses in a frame.

SPHERE, CYLINDER AND AXIS - Components of a prescription for a refractive error.

STRABISMUS - A manifest deviation of the eyes from the parallel position.

TONOMETRY - The measurement of intraocular pressure.

VISUAL ACUITY - The degree of central vision in the distance and at the reading point.

VISUAL FIELDS - The locus or object of points in space that can be perceived when the head and eyes are kept fixed.

APPENDIX I

TERMS OF REFERENCE AND MEMBERSHIP OF THE VISION CARE TASK FORCE

Chairman

John E. Liersch, O.C.

Secretary:

Donald O. Anderson, M.D. (Health Manpower Research Unit) (to June 30, 1977)

Brian T. Schmidt, O.D. (from July 1, 1977)

Representatives of the British Columbia Optometric Association:

Robert J. Scholefield, O.D.

William R. McRoberts, O.D.

Alternate

Sherman O. Olson, O.D.

W. Norman Armstrong, O.D.

Representatives of the University of British Columbia Department of Ophthalmology

John S.F. Richards, M.D.

Alternate

Stephen M. Drance, M.D.

Representatives of the College of Physicians and Surgeons of B.C.

A. C. Waldie, M.D.

Alternative

J.A. Hutchison, M.D.

Representatives of the British Columbia Medical Association

Alfred J. Elliot, M.D.

Alternate

R. M. R. Innes, M.D.

Representative of the Medical Services Commission

D.M. Bolton, M.D.

Representative of Community Health Programmes

Ms. Merilee A. Mitten (Orthoptist)

Representative of the Dispensing Opticians Association of British Columbia

Mr. R. L. Stewart (Dispensing Optician)

Representatives of the Ministry of Education

A.E. Soles, M.Ed.

John Bottomley, Ph.D.

Staffing

Editorial :

Brian T. Schmidt, O.D.

Computing:

Gordon Muir, B.Sc.

Secretarial:

Mrs. Fran Minogue

Mrs. Jalna Lynch

VISION CARE TASK FORCE

MINISTRY OF HEALTH, BRITISH COLUMBIA

Terms of Reference

1. To prepare plans for a coordinated vision care system for the Province of British Columbia, to be fully implemented within ten to fifteen years, considering:
    a. the delegation of functions to and development of referral arrangements between appropriately trained vision care personnel;
    b. the requirements for vision care of different regions within the Province;
    c. the impact of new technology upon these arrangements; and
    d. the frequency with which certain vision care services should be provided to the population.
2. To describe the training arrangements and numbers of different types of personnel required for the system proposed.
3. To establish a timetable for the gradual implementation of the system, starting immediately, and taking into account:
    a. the present and projected population and immigration of vision care personnel;
    b. the location of training programs in Western Canada and, in particular, in the Province of British Columbia;
    c. the economic hardships of implementation to existing personnel in the Province; and
    d. the establishment of targets of functions and productivity to be met during the implementation.

APPENDIX II

COST TO THE PUBLIC OF B.C. OF THE VISION CARE SYSTEM - 1976

A. PROFESSIONAL COSTS		
1. Screening		
In 1976, 110,000 school children were screened. At five minutes per child, this requires about 1,300 days of nursing time, or six Public Health Nurse equivalents. Estimate		$ 100,000
2. Medical System		
General Practitioners: 70,000 services @ $9.80	$ 686,000	
Specialists: 1,000 services @ $60.60	60,600	
Ophthalmologists: Consultations, 71,000 @ $25.80	1,831,800	
Refractions, 234,000 @ $21.00	4,914,000	
Total Medical System		7,492,400
3. Optometric System		
220,000 services @ $20.00		4,400,000
Total Professional Services Costs		11,992,400
B. SPECTACLE AND CONTACT LENS COSTS		
1. Spectacles		
Assume 4/5 of all refractive services by both ophthalmologists and optometrists result in a prescription for spectacles @ $60.00 each:		
4/5 x 454,000 x $60.00		21,792,000
2. Contact Lenses		
Assume 10% of those purchasing spectacles will also be fitted with contact lenses (i.e. 36,320), that the same percentage will use the medical and optometric services, and that 5,000 will use neither system:		
a. Medical System		
i. Ophthalmology Services:		
18,160 x fee of $61.00 (one first visit, three subsequent visits)	1,107,760	
ii. Opticians:		
18,160 x $175.00	3,178,000	
b. Optometric Services		
18,160 x $200.00 (includes cost of lenses)	3,632,000	
c. Direct Opticianry		
5,000 x $175.00	875,000	
Total Contact Lens Costs		8,792,760
GRAND TOTAL COST		$42,577,160

APPENDIX III

CALCULATION OF FULL-TIME EQUIVALENTS

Since not all practitioners will be in active practice while others will be working at very high levels of productivity, some adjustment must be made to the raw manpower stock numbers. The calculation of full-time equivalents (FTE) thus provides a means of assessing the total person equivalents of vision care manpower in a specified region.

Optometrists and Ophthalmologists both directly bill the Medical Services Plan of British Columbia for vision and eye services. Although the proportion of income received from the Plan varies between the two groups, it is possible to examine the earnings from the Plan for the individual members of each group separately and express the total dollar value of a given practitioner's billings as a function of the group mean. This assumes that billing is a surrogate for activity. Analyses were made of all services billed during the period April 1, 1975 to March 31, 1976, using tapes provided by the Medical Services Commission.

For example, one FTE ophthalmologist is a mean billing of $83,000 to MSC in 1975-1976. If an ophthalmologist bills only $45,000 to the Plan, he would represent only 0.54 FTE (i.e., 45/83). These FTEs are summed within a regional hospital district by computer, maintaining the confidentiality of the data, to produce FTE per population and FTE per number of practitioners. The latter statistic gives some measure of the activity of practitioners in a region: areas where the ratio

FTE/Number is higher than 1.00 are areas where the practitioners are more productive than the provincial average.

The actual calculation of FTE's is based upon a billing range for ophthalmologists and for optometrists that is normally distributed. Very high and very low earners are not included in the calculation of the mean income that is used for the base value of 1 FTE. Instead, distributions of earnings were examined and the extremes were truncated as follows:

Ophthalmology

Billing range considered: \$50,000 to \$121,000

1 FTE = ...\$83,000

Optometry

Billing range considered: \$13,000 to \$40,000

1 FTE = ...\$25,750

Certain non-ophthalmic physicians also provided refractive services. Their FTEs were calculated by comparing their billings for Fee Code 2015 to the second and third quartiles of ophthalmologists' billings for 2015. Thus 1 FTE for these physicians = \$17,728 for item 2015 only.

APPENDIX IV

CURRICULUM FOR OPHTHALMOLOGY, OPTOMETRY AND ORTHOPTICS

Ophthalmological Residency Program*

University of British Columbia

Refraction	- lectures and supervised instruction with patients	1st year - 72 hours
Optics	- geometrical	1st year - 19 hours
	- physiological	1st year - 19 hours
Outpatient Department (refraction)		1st year - 50 hours
		2nd year - 50 hours
U.B.C. Student Clinic		2nd year - 20 hours
Low Vision Clinic		2nd year - 20 hours
Shaughnessy Hospital Clinic		1st year - 100 hours
		3rd year - 100 hours
Contact Lens Clinic		2nd year - 100 hours
		3rd year - 50 hours
Family Practice Clinic		2nd year - 36 hours
Fort St. John Clinic		3rd year - 200 hours
Eskimo Clinic		3rd year - 25 hours

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* A four year post-graduate course after obtaining the M.D. degree.

The Department of Ophthalmology at the University of British Columbia

> offers practical experience in examination, investigation and management of patients in the neuro-ophthalmology, retina, cornea glaucoma, refraction and contact lens clinics under supervision in addition to general ophthalmology and paediatric ocular motility clinics throughout the week. Instruction and assistance is given in the practical performance of major and minor ophthalmic surgical procedures. The management of patients with emphasis on solving diagnostic problems and performance of medical and surgical therapy is undertaken on both an in-patient and out-patient basis with follow-up clinics. (UBC, 1977).

The calendar of the University of British Columbia lists the following courses:

> Ophthalmology Rounds (700); demonstration, review of signs and symptoms, etiology, pathogenesis and treatment of current general ophthalmic disorders. One and one half hours weekly;
>
> Ophthalmic Microbiology (702); supervised demonstration, diagnosis and discussion of microbiology problems, involving patients, slides and cultures. One hour weekly.
>
> Ophthalmic Pathology I. (703); Supervised demonstration, discussion and tutorial of current ophthalmic pathological specimens. One and one half hours weekly.
>
> Ophthalmic Pathology II. (704): Clinicopathological correlation of ophthalmic specimens. One hour weekly.
>
> Neuro-ophthalmology (705); Lectures and seminars to cover the important and common neuro-ophthalmic disorders, emphasizing etiology, pathogenesis, treatment and investigation. One hour weekly.

Retina and Fluorescein Angiography Tutorial (706); Lectures and demonstrations of retinal disease, study and interpretation of fluorescein angiograms. One hour weekly.

Glaucoma Tutorial (707): Lectures and demonstrations to cover signs, symptoms, pathogenesis, etiology, investigation and treatment of ocular hypertension. One hour weekly.

Ocular Motility Tutorial (708); Lectures and demonstrations of motility problems, with clinicopathological correlations. One and one half hours weekly.

Ophthalmic Research (709); During the first year of ophthalmic training for those residents choosing this selective activity.

Lectures in anaesthesiology, radiology, radiotherapy, plastic surgery, ear, nose and throat, neurology, neurosurgery, diabetes, hypertension optics, as they pertain to ophthalmology (710); two hours per week.

Further, every resident takes the Basic Science Course in ophthalmology offered at Stanford University Medical Centre. This course consists of ten weeks of instruction in the basic sciences relating to ophthalmology. It is intended primarily for residents in training and may be taken at any point during the residency program. The program is accredited by the American Board of Ophthalmology, and includes the following curriculum:

Anatomy of the Orbit and Globe	34	hours
Pathology and Electron Microscopy	107	"
Embryology and Genetics	11	"
Ocular Microbiology, immunology, and external diseases	50	"
Biochemistry and Physiology	27.5	"
Pharmacology, autonomic physiology, and toxicology	30	"
Glaucoma	11	"
Neuro-ophthalmology and neuroanatomy	41.5	"
Optics and Theory of Refraction	30	"
Motility	30	"
	372	hours

SCHOOL OF OPTOMETRY
UNIVERSITY OF WATERLOO

SUMMARY

OF

EDUCATIONAL PROGRAMME

APPENDIX I

GENERAL AND OCULAR PATHOLOGY

APPENDIX II

CONTACT LENS PROGRAMME

May, 1977

SCHOOL OF OPTOMETRY

UNIVERSITY OF WATERLOO

Educational Programme

The two main roles of the School are to prepare students for the practice of Optometry as required to meet the public need and to carry out research in vision and vision care so as to enhance the value of the services provided.

The objectives of the clinical programme of the School have been stated as follows:

1. To provide undergraduates and graduates with experience in diagnosing, prescribing and treating visual and ocular anomalies.
2. To develop models of vision service delivery and to train undergraduates within these models.
3. To provide a clinical research environment wherein the resources for providing vision and eye care can be evaluated, extended and improved.

The programme in optometry is presented over a four-year period of didactic, laboratory and clinical training. In addition, 3½ months in the summer between the 3rd and 4th year are spent in clinical work.

Entrance is gained following completion of Grade XIII in Ontario or its equivalent, and although a growing number of candidates hold a Baccalaureate in Science, they must have had at least one year in science at a recognized Canadian university. Competition for admission to optometry is strong (6 applicants for every 1 admitted) and the academic qualifications of candidates is high (75% and over).

The programme is based in the physical and biological sciences which support the core subjects of physiological optics (visual sciences) and optometry (clinical sciences). Most of this instruction takes place during the first three years. The last two years of the programme deal mainly with clinical subjects and optometric practice.

Without having to refer to a more detailed list of subject matter as found in the course outlines (these are available on request), the following general list of topics will prove helpful as a description of the programme.

1. Optics
    - nature of light
    - refraction and reflection of radiant energy
    - principles of optical systems (thin and thick)
    - the optics of diagnostic instruments
    - ophthalmic materials as therapeutic devices - spectacle lenses, (simple and complex) contact lenses, (hard, soft) protective lenses, low vision aids and filters.
    - fabricating of ophthalmic materials
2. Life Sciences
    - general human anatomy
    - ocular anatomy
    - comparative anatomy
    - neuroanatomy
    - embryology
    - general physiology

2. Life Sciences (continued)
   - ocular physiology
   - cellular biochemistry
   - human genetics
   - neurophysiology of visual systems
   - electrophysiology of visual systems
3. Physiological Optics
   - anatomical and physiological processes associated with responses to light
   - measurement and specification of visual stimuli, light sources, photometry, radiometry
   - ocular sensory mechanism, photoreception, transmission, spatial and temporal resolution and interaction
   - ocular motility - eye and brain mechanisms subserving ocular movement - how measured
   - binocular vision - binocular phenomena, eye and brain mechanisms subserving binocular vision - how measured
   - perception and information processing as related to the perception of such entities as time, size, shape, colour, form, distance and motion
4. Pathology - (See also Appendix I)
   - general pathology - essentials - bacteriology, virology, immunology, epidemiology
   - the properties of micro-organisms, the process of infection, pathogenesis, immunity and the principles of disinfection and chemotherapy

4. Pathology (continued)
   - study of disease processes and disease manifestations of tissue changes, tumor formation, allergies, disturbances of circulation, disturbances of metabolism, injuries
   - ocular pathology
   - the etiology, epidemiology, symptoms, signs, causes and sequelae of ocular disease and anomalies
   - disease and anomalies of ocular adnexa
   - disease and anomalies of inner eye, including those of the optic pathways and brain
   - ocular manifestations of systemic disease and other anomalies
   - principles of emergency care
5. Pharmacology
   - cholinergic system, adrenergic system, transmitters, antibiotics, absorption, excretion, biotransformations
   - ANS pharmacology - sites of action
   - muscarine drugs, antimuscarine drugs
   - cholinesterases, anticholinesterases
   - sympathomimetics and sympathetic blocking agents
   - antihypertensives
   - diuretics
   - general anaesthetics and soporifics
   - narcotics
   - antihistamines
   - tranquilizers

5. Pharmacology (continued)
   - endocrines
   - local anaesthetics
   - ocular diagnostic drugs, doses, administration
   - contact lens solutions
   - ocular side effects of drugs
6. The Health Professions
   - history of the health professions
   - health care delivery systems - vision care delivery systems
   - modes of optometric delivery systems
   - inter-relations between health care practitioners
   - community health care education - instruction by faculty members of School of Hygiene, University of Toronto
   - team approach to vision care
   - health legislation
   - management of optometric practice
7. Optometry
   - the case history - purpose of, how taken, use and evaluation
   - external and internal examination of the eye for disease and other abnormalities by means of ophthalmoscopy, biomicroscopy, tonometry, field charting, etc.
   - eye manifestations of systemic diseases
   - evaluation of the refractive status of the eye when viewing distance and near objects
   - evaluation of motor systems subserving eye movements

7. Optometry (cont'd)

- evaluation of motor and sensory characteristics of binocular vision
- evaluation of strabismus and amblyopia
- colour vision testing
- examination and interpretation of visual fields
- modes of treatment - spectacle lenses, contact lenses, prisms, filters, orthoptics, drugs and surgery
- the specialized procedures and services required in fitting contact lenses, low vision aids, carrying out orthoptics and aniseikonic cases
- special aspects of treatment, counselling and management of vision problems in pediatric, geriatric, mentally retarded, physically handicapped, nursery school and school, and industrial populations
- the use of electrodiagnostic analysis

  (i) the electroretinogram

  (ii) the electro-oculogram

  (iii) the electroencephalogram as applied to Visually Evoked Responses

GRADUATE COURSES

* An asterisk indicates a one term course. Not every course listed is given in any one year.

600* Vegetative Physiology of the Visual System
Glandular and secretory mechanisms of the eye, intraocular fluid dynamics. Physiological and physical properties of the cornea, crystalline lens, and vitreous.

601* Optical Characterics of the Eye
The refractive state of the eye and its variables, transmittance, absorption, scattering by the ocular media, pupil size, aberrations, diffraction limitations, resolution, and contrast transfer functions.

602* Ocular Motility
Kinematics of eye movements, specifications of the direction of regard, neurology of oculomotor functions, oculomotor systems and types of eye movements, the pathologies of oculomotor systems and their effects.

603* Accommodation and Convergence
Mechanism of accommodation, stimulus to accommodation, time and amplitude characterists of the response, synkinesis of accommodation and convergence, ACA ratio, the zone of clear single binocular vision.

604* Visual Perception of Space
Oculocentric and egocentric directionalization, monocular clues for depth perception, distance and size relationships; real and apparent motion, the theoretical and nonius horophter and the apparent fronto-parallel plane, stereopsis, aniseikonia, Pulfrich effects; alley experiments and the geometry of visual space.

605* Psychophysics of Colour Vision
Normal and defective spectral sensitivity colour discrimmination and colour matching functions. Colour perception in the peripheral retina and by small fields. Chromatic adaptation. Colour vision in animals. Theories of colour vision.

606* Radiation and the Visual Stimulus
Measurement and specification of light; radiometric and photometric relationships; spectrophotometry and the C.I.E. colorimetric specification of visual stimuli, radiation limits of the visual system.

607* Physiology of the Visual Process
Anatomy and neurophysiology of the retina lateral geniculate body and cortex, photochemistry of vision, electrophysiology of the visual system.

608* Special Topics in Physiological Optics
Topics in the fields of specialization of the faculty may be studied by special arrangements with the faculty member, the student and his committee.

609* Current Problems in Physiological Optics
Seminars covering major topics not presently included in available courses. Graduate students are expected to give papers on readings or research and to contribute to discussions throughout their individual programmes. This course will count for one half course credit.

610* The Comparative Anatomy and Physiology of the Vertebrate Eye
An evaluation of evolutionary lines of development of visual structures and functions; the vascular system, accessory glands, light control mechanisms, the distribution of visual pigments, accommodation, binocular vision and neural coding.

698 M.Sc. Thesis

Alternate graduate programmes are available both within the University of Waterloo and other Universities. Doctoral (Ph.D.) programmes are also available in Physiological Optics for those who wish to become even more highly qualified.

University of Waterloo, School of Optometry
Programme In General And Ocular Pathology

The professional programme in Optometry is designed to provide the student with the necessary background and clinical experience to allow him to enter the practice of Optometry not only as it is currently envisioned but also as it develops in future. For this reason, all aspects of the programme are interrelated to a high degree and there is considerable interpenetration of subject areas. Students entering Optometry have as a minimum completed first year University courses in biology, physiology and chemistry. Anatomy, histology and embryology are covered in the second year of the professional program. Ocular and general first aid are formally taught and are practised when required. The course in general pathology is taken in year three and involves 75 hours of lecture and 25 hours tutorial. This course covers fundamental processes of disease, microbiology, systemic disease, and places particular emphasis on systemic conditions with ocular manifestations. The course is supplemented by a series of topical seminars provided each year by professors and clinical teachers from the McMaster University Medical Center. Instruction in pharmacology covers not only the diagnostic drugs but also the therapeutic agents likely to be administered by physicians and their possible adverse effects.

A course in genetics is given in the final year to enable the graduate to recognize and deal with the various syndromes he may encounter. The course in ocular pathology is taken in year four and comprises 91 hours of lectures and 26 hours of clinical laboratory work. The full range of diagnostic instruments is implemented in this course, along with appropriate clinical techniques. The Clinic of the School of Optometry is an important adjunct to the teaching program in ocular pathology. Twenty-five thousand patients are seen in our clinics annually, providing a pool of cases suitable to illustrate the majority of pathological conditions involving the eye. Extensive photographic work is done in the clinic to provide materials for case discussions as well as to support diagnoses. Interprofessional referrals and clinical case conferences in institutions make it possible for the students to get the benefits of a team assessment of appropriate patients. Each year continuing education courses and clinics dealing with various aspects of pathology are provided. The instructors include optometrists, physicians, ophthalmologists and other experts in related fields. See attached course outlines.

School of Optometry

Optometry 305-315

General Pathology (Fall-Winter 1975-76)

Instructor: T.D. Williams, O.D., Ph.D.

Course Requirements: Students will submit two papers relevant to General Pathology. There will be four hourly examinations and a comprehensive examination at the end of each term.

REQUIRED TEXTS:
Hopps, Principles of Pathology
Anderson & Scotti, Synopsis of Pathology
Dorland's Illustrated Medical Dictionary

COURSE OUTLINE:
- Biostasis and Pathogenesis
- Blood as a tissue
- Reticuloendothelial System: myeloid and lymphatic divisions
- Disturbances of Circulation:
  - hemorrhage
  - arrest of hemorrhage, clotting
  - thrombosis
  - embolism
  - ischemia, infraction
  - hyperemia
  - edema

- Inflammation
- Repair and Healing
- Disturbances of Growth:
  - developmental
  - acquired
- Pigment Disturbances
- Degeneration
- Necrosis
- Infiltrations; metabolic Disorders
- Storage Diseases
- Calcium Disturbances
- arteriosclerosis
- atherosclerosis
- Hypersensitivity
- Infectious Granulomas
- Syphilis
- Neoplasia
- Infection
- Microbiology: introduction
- Evolution of protists, plants, animals
- Eucaryotic, Procaryotic cell
- Life and Death of Bacteria: growth curve
- Sterilization
- Control of Bacteria via Physical and Chemical Agents
- Antibiotics
- Distribution of Bacteria indigenous to man
- Koch's Postulates

END OF FIRST TERM

SECOND TERM

Pathogenic Bacteria
staphylococci
streptococci
pneumococci
diseases produced by bacteria
rickettsia
viruses
fungi
protozoans
metazoans
diseases of systems: CIRC
RESP
GI
GU
ductless glands
HEMOPOIETIC
Skeletal
CNS
fluid compartments
physical agents producing disease
pregnancy
arthritis, rheumatism, multiple sclerosis
sarcoidosis

END OF SECOND TERM

University of Waterloo

Optometry 405 - 415

Ocular Pathology

1975 - 1976

The purpose of this course is to train optometry students to recognize and understand all the kinds of pathology which they are likely to encounter in clinical practice.

The detection and assessment of pathology requires the application of appropriate procedures and therefore the student must acquire proficiency in specific techniques as well as skill and experience in the interpretation of clinical data.

Instruction in this course builds upon the knowledge gained in previous courses, e.g., general pathology, microbiology, anatomy, embryology, etc. In addition to lectures which can only touch briefly upon a few of the topics which must be studied this year, the student will be involved in library research and laboratory work particularly the study of slides and photographs. The most meaningful part of his training involves working with actual patients in the clinic under close supervision. He will be required to make written reports and to discuss his clinical decisions in seminars. This learning process is one which each optometrist must continue throughout his professional life. Most eye diseases are rare, and the clinical appearance seldom matches that illustrated in text books. Each year improved methods of diagnosis and treatment become available and even the basic concepts of pathology evolve with time. Particular attention will be given to the following topics: - glaucoma detection, the analysis of field defects, headache syndromes, diabetes, cataract, macular degeneration, corneal pathology, differential diagnosis of the red eye, fundus changes in arteriosclerosis and hypertension, ocular signs of systemic diseases. Identification and differential diagnosis of ocular diseases are involved. Students must learn to think of and to describe disease processes at the cellular level. Specific pathology of each ocular structure is covered. Recent editions of the following texts are used:-

1.	Newell	Ophthalmology, Principles and Concepts
2.	Scheie and Albert	Adler's Textbook of Ophthalmology
3.	Doggart	Ocular Signs in Slit-lamp Microscopy
4.	Vaughan	General Ophthalmology

The following books also serve as examples of useful references.

Hogan & Zimmerman	Ophthalmic Pathology
Becker & Shaffer	Diagnosis and Therapy of the Glaucomas
The Merck Manual	

Students will need to consult journals and additional reference books in the library.

In the clinical portion of the course students are required to demonstrate proficiency in the following techniques as well as an understanding of their use in pathology detection:-

1. Skilful, courteous, practical, professional concern for and involvement with each patient seen.
2. History taking, external examination including photography.
3. Ophthalmoscopy, direct and indirect.
4. Tonometry, Schiotz, electronic, applanation.
5. Field assessment and analysis of field charts for localization of lesions. Field will be plotted by campimeter, tangent screen, Amsler charts, perimeter.
6. Biomicroscopy of the anterior segment of eye.
7. The ability to arrive at a logical decision based on the avialable data and to make proper disposal of the case.
8. How to care for children, the elderly, handicapped patients, bed-confined patients and other problem cases.

9. When and how and to whom to refer for consultation. The basis for referral. The making of a suitable report to the consultant.
10. The ability to search the literature for relevant information.

In addition the student is expected to gain experience and show increasing proficiency in the following:-

1. The ability to correlate history, symptoms and signs.
2. The ability to make a reasonable prognosis from the data available. The ability to assess all patients in terms of seriousness and to carry out counselling.
3. Gonioscopy, fundus photography, exophthalmometry.
4. The use of the Hruby lens and other techniques to examine the deeper structures of the eye.
5. The use of screening instruments and techniques e.g., multiple pattern field screeners, intraocular tension screening devices, school and industrial vision screening devices.
6. The relationship between color vision defects and various pathological conditions.
7. The use of commonly employed drugs to aid in recognition of ocular pathology
8. The ability to use expertly and to care for the instruments currently available. The ability to assess the validity, practicality and value of new instruments and techniques.

Optometry 405
Ocular Pathology
First Term 1975-76

T.D. Williams, O.D., Ph.D.

COURSE OUTLINE

clinical techniques				Lecture
	Sept.	8		case history
fundus photography		10		"
		12		"
		15		functional examination
Tonomat, dir. ophthalmoscopy		17		"
		19		physical examination
		22		"
Amsler grid, AC depth, slit lamp		24		injuries
(ant. seg)		26		"
		29		OCULAR PATH.BY STRUCTURE
Tangent screen	Oct.	1		lids
		3		"
		6		conjunctiva
perimetry: Rodenstock		8		"
Goldmann		10	TEST	cornea
		15		"
Goldmann tonometry		17		sclera
		20		lacrimal apparatus
MacKay-Marg tonometry		22		"
		24		Orbit
		27		"
gonioscopy		29		iris
		31		"
	Nov.	3		pupil
Schiotz tonometry, NCT tonometry		5		"
		7		ciliary body
		10		uveal tract
field screeners		12		"
		14	TEST	"
		17		"
exophthalmometry		19		lens
		21		"
		24		"
fundus photog by internes		26		vitreous
		28		"
	Dec.	1		retina
		3		"

Optometry 415
Ocular Pathology
Second Term 1975-76

T.D. Williams, O.D., Ph.D.

COURSE OUTLINE

CLINICAL TECHNIQUES		LECTURE
Fundus photography by internes	Jan 5	Retina (cont'd)
	7	"
	9	"
Indirect ophthalmoscopy	12	"
	14	"
	16	"
Tonography	19	Optic Nerve
	21	"
	23	visual pathways
Slit Lamp Photography	26	"
	28	field defects
	30	"
External photography	Feb 2	Glaucoma
	4	"
	6	Extraocular Muscle Disorders
Tangent Screen Defects	9	"
	11	Infectious eye diseases
	13	"
Ophthalmodynamometry	16	Systemic Disease and the Eye
	18	"
	20	"
Goldmann tonometry recap	23	Hereditary disorders
	25	"
	27	Endocrine disease and the eye
Slit Lamp recap (cornea)	Mar 1	"
	3	"
	5	Diseases of the Blood and the eye
Slit Lamp recap (lens)	8	"
	10	Collagen Diseases and the eye
	12	"
Slit Lamp recap (fundus)	15	Muscle and Joint disease & the eye
	17	"
	19	"
Selected patients	22	Headache
	24	"
	26	Ocular Emergencies
Selected patients	29	"
	31	Review

University of Waterloo

School of Optometry

Contact Lens Programme

A Summary Of The Present Contact Lens Programme

	Lecture Hours	Lab Hours	Clinic Hours
Optom. 407	26	26	-
Optom. 408	-	-	26
Optom. 418	-	-	26
Optom. 428	-	-	16
Optom. 502	15	-	6
Optom. 508	-	-	75
Optom. 518	-	-	75
Totals	41	26	224

The average number of contact lens patients attended by each student is forty. Eleven of these are original fits in which the student initiates the examination, fitting, delivery of lenses and follow up care involving about 7 visits in the case of each patient.

UNIVERSITY OF WATERLOO

SCHOOL OF OPTOMETRY

CONTACT LENS CLINIC SYLLABUS

Fourth Year

During the fall term, fourth year students will familiarize themselves with contact lens fitting procedures by fitting "hard" contact lenses on each other. The schedule of activities will be as follows (in all sessions, students will work in pairs, each student acting both as subject and, examiner for each activity.

1st week:	Biomicroscopy. Students will familiarize themselves with all methods of illumination.
2nd week:	Measurement of pupil size, corneal diameter and palpebral aperture width. Keratometry-measurement of both central and peripheral areas of the cornea. Pachometry-measurement of the central corneal thickness. Measurement of tear flow.
3rd week:	Use of diagnostic lenses. Lens verification and inspection. Inspection of fluorescein pattern, and biomicroscopy with lenses on; ordering lenses.
4th week:	Lens verification and inspection, using trial lenses; practice insertion and removal of lenses.
5th week:	Delivery of partner's lenses, including verification and inspection of the finished lenses. Teaching of insertion and removal techniques.
6th week:	Progress check on one partner. Complete all tests of progress check form. In particular look for (a) clouding of the cornea (biomicroscope) (b) steepening of the cornea (keratometer) (c) increase in myopia (subjective)
7th week:	Progress check on other partner, complete all tests on progress check form, as above.
8th week:	Second progress check on first partner. Complete all tests on form.
9th week:	Second progress check on second partner. Complete all tests.

10-13 weeks: Third progress check on each partner. The instructor will demonstrate modification procedures used for:

(a) reducing diameter
(b) applying and polishing a bevel
(c) applying secondary curve
(d) blending transition zones
(e) finishing edges.

General principles applying to Fourth Year contact lens clinics

1. Appropriate forms are to be used at all times, and signed by instructor at the end of each clinic session. These forms include:

   (a) Preliminary work up sheet
   (b) Fitting data sheet
   (c) Order form
   (d) Progress check form

2. It will be each students responsibility to make sure that progress checks are carried out on his partner (or on another student assigned to him) and to bring any fitting problems to the attention of the instructor.

3. No student may fit a "real" patient with contact lenses until he has (a) built up to all day wearing time with hard lenses; (b) has fitted his partner successfully with hard lenses, I.E. to all day wearing time.

4. No student may be fitted with soft lenses until he has built up all day wearing time with hard lenses.

5. In progress checks, emphasis will be placed upon tests done after removing lenses including:

   (a) biomicroscopic inspection for corneal clouding
   (b) keratometric evaluation of corneal steepening or flattening
   (c) subjective determination of increase or decrease in myopia

Correct blinking should be emphasized in patient instruction: many practitioners are now of the opinion that a large percentage of contact lens failures are due to poor blinking. A patient hand-out entitled "Instructions for correct Blinking" is available from the contact lens office.

During the winter term, progress checks will be continued, as needed, and students will practice modification procedures. If new patients are available, a limited number may be fitted by those fourth students who have built up their wearing time to all day with hard contact lenses.

UNIVERSITY OF WATERLOO

SCHOOL OF OPTOMETRY

OPTOMETRY 407

Contact Lens Lectures

Instructor: Dr. M. Callender

1. Introduction - Contact lens terminology, Lens specifications and verification.

2. Topography of the Cornea
   - methods of measurement
   - analysis and applications.

3. Anatomy and Physiology of the cornea and lids.
   Adnexa
   Lacrimal system
   Biomicroscopy
   Schirmer tear test
   Tear breakup time

4. Preliminary Evaluation of the Patient
   - Patient Selection
   - Contra indications

5. Diagnostic Hard Lens Selection and Evaluation of Fit
   - Fluorescein patterns
   - Over refraction
   - Fitting techniques or philosophies

6. Designing and Ordering

7. Inspection, Verification and Preparation

8. Instructions to patient on care and hygiene, wearing schedule.

9. Contact Lens solutions, storage cases and accessories.

10. Patient Management - Symptomatology and trouble shooting.

11. Optics

12. Residual Astigmatism and the Application of Toric lens designs.

13. Practice Management - fees, recall, etc.

14. Special Cases - aphakia, keratoconus, presbyopia.

15. Flexible Lenses
    - Historical Development
    - Physico chemical characteristics
    - Contra-indications

16. Fitting Philosophies on Flexible Lenses.

17. New Materials
    - Gas permeable
    - Silicone

18. Scleral lens fitting

19. Prosthetic contact lenses
    - scleral hard and soft lenses

20. Case presentations.

21. Aspheric contact lenses.

University of Waterloo

School of Optometry

Optometry 408

Contact Lens Clinics

1. Use of biomicroscope in contact lens fitting
2. Physical measurement of corneal surface and thickness
   - Keratometry, Photokeratometry and Pachometry
3. Measurement of tear quality and quantity
4. Use of diagnostic lenses
5. Designing, verifying and delivery of contact lenses
6. Follow up care
7. Evaluation and problem solving

Contact Lens Laboratories

1. Verification and inspection of contact lenses
2. Reducing lens diameters
3. Applying secondary curves and polishing
4. Eliminating scratches and power changes
5. Finishing lenses - from uncut lenses
6. " "
7. " "
8. " "
9. " "

10. Finishing lenses
11. Verification and inspection of flexible hydrophilic lenses
12. Effects of solution tonicity on flexible hydrophilic lens stability

Optom. 502

Course Outline

1. Review of contact lens fitting
2. Procedures for fitting new lens types
3. Efficacy of recommended care systems
4. Optics of flexible lenses
5. Effects of various contact lens materials on corneal physiology
6. Microbiology of contact lenses

Laboratories

Applied Microbiology for optometrists

Students receive formal lectures in:

- Anatomy
- Physiology
- Optics
- Neuro-ophthalmology
- Visual Fields
- Perimetry
- Tonography
- Theoretical and practical orthoptics
- Principles of surgical treatment
- Ocular syndromes

Distribution of Orthoptists in B.C.

Presently there are 22 certified orthoptists in B.C. These personnel are working in hospital eye clinics, ophthalmologists' private offices, and for the Metropolitan and Provincial Health services.

Total number of Orthoptists in B.C. = 22

Active	16
Non-active	6
Full-time	11
Part-time	5

Location of Orthoptists in B.C.

Public Health: 3	2 Vancouver 1 Victoria
Hospitals: 5	5 Vancouver
Doctors' offices: 8	1 Penticton 1 Nanaimo 1 New Westminster 1 Burnaby 1 Surrey 3 Greater Vancouver

Distribution of ages

20 - 24	years:	1
25 - 29	"	8
30 - 34	"	6
35 - 39	"	1
40 - 44	"	2
45 - 49	"	3
50 Plus	"	1

Workload/Productivity of Orthoptists

Hospital (Vancouver)*	January-December 1976	January-June 1977
Applanation tonometry	11	368**
Tonography	265	91
Water Provocative	27	10
Fields-Tangent Screen	4	1
Fields - Goldman	1033	513
Muscle Work-up	414	189
Orthoptic Treatment	633	463
Hess Screen	44	29
Fluorescein Angrography	213	121

* 2 full-time orthoptists
** done routinely now on all field patients

Doctor's Office (Vancouver)*	October 27/76 - August 1/77
Muscle work-ups	319
Visual fields (tangent screen)	22
Auto-refractor	25 patients average/day

* 1 full-time orthoptist

Public Health (Greater Vancouver) July 1976 - June 1977

2 full-time orthoptists. 12,368 from ages 6 months to 40 years were tested

	6 mos.-4 yrs.	5-19 yrs	20 yrs+
Vision screening	2,321	9,883	164

APPENDIX V

PROJECTIONS OF VISION CARE MANPOWER STOCK

1. Ophthalmologists, age group 30 - 34

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t+1 ※	Aging to next Age Group *	Stock at t+1
1976	15.00	3.25	0.00	0.00	18.25	3.65	14.60
1977	14.60	3.25	0.00	0.00	17.85	3.57	14.28
1978	14.28	3.25	0.00	0.00	17.53	3.51	14.02
1979	14.02	3.25	0.00	0.00	17.27	3.45	13.82
1980	13.82	3.25	0.00	0.00	17.07	3.41	13.66
1981	13.66	3.25	0.00	0.00	16.91	3.38	13.58
1982	13.58	3.25	0.00	0.00	16.77	3.35	13.42
1983	13.42	3.25	0.00	0.00	16.67	3.33	13.34
1984	13.34	3.25	0.00	0.00	16.59	3.32	13.27
1985	13.27	3.25	0.00	0.00	16.52	3.30	13.21
1986	13.21	3.25	0.00	0.00	16.46	3.29	13.17
1987	13.17	3.25	0.00	0.00	16.42	3.28	13.14
1988	13.14	3.25	0.00	0.00	16.39	3.28	13.11
1989	13.11	3.25	0.00	0.00	16.36	3.27	13.09
1990	13.09	3.25	0.00	0.00	16.34	3.27	13.07
1991	13.07	3.25	0.00	0.00	16.32	3.26	13.06

※ (initial stock) + (inflow) + (from previous age group) - (outflow)

* 20% of theoretical stock per year (age of stock 29 - 34)

PROJECTION OF VISION CARE MANPOWER STOCK

2. Ophthalmologists, age group 35 - 54

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t+1¤	Aging to next Age Group *	Stock at t+1
1976	77.00	3.75	3.65	1.00	83.40	4.17	79.23
1977	79.23	3.75	3.57	1.00	85.55	4.28	81.27
1978	81.27	3.75	3.51	1.00	87.53	4.38	83.16
1979	83.11	3.75	3.45	1.00	89.36	4.47	84.89
1980	84.89	3.75	3.41	1.00	91.05	4.55	86.50
1981	86.50	3.75	3.38	1.00	92.63	4.63	87.99
1982	87.99	3.75	3.35	1.00	94.09	4.70	89.39
1983	89.39	3.75	3.33	1.00	95.47	4.77	90.70
1984	90.70	3.75	3.32	1.00	96.77	4.84	91.93
1985	91.93	3.75	3.30	1.00	97.98	4.90	93.08
1986	93.08	3.75	3.29	1.00	99.12	4.96	94.16
1987	94.16	3.75	3.28	1.00	100.19	5.01	95.18
1988	95.18	3.75	3.28	1.00	101.21	5.06	96.15
1989	96.15	3.75	3.27	1.00	102.17	5.11	97.06
1990	97.06	3.75	3.27	1.00	103.08	5.15	97.93
1991	97.93	3.75	3.26	1.00	103.94	5.20	98.74

¤ (initial stock) + (inflow) + (from previous age group) - (outflow)

* 5% of theoretical stock per year (age of stock 35 - 54)

PROJECTION OF VISION CARE MANPOWER STOCK

3. Ophthalmologists, age group 55 - 64

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t+1¤	Aging to next Age Group*	Stock at t+1
1976	22.00	0.25	4.17	0.25	26.17	2.62	23.55
1977	23.55	0.25	4.28	0.25	27.83	2.78	25.05
1978	25.05	0.25	4.38	0.25	29.43	2.94	26.49
1979	26.49	0.25	4.47	0.25	30.96	3.10	27.86
1980	27.86	0.25	4.55	0.25	32.41	3.24	29.17
1981	29.17	0.25	4.63	0.25	33.80	3.38	30.42
1982	30.42	0.25	4.70	0.25	35.12	3.51	31.61
1983	31.61	0.25	4.77	0.25	36.38	3.64	32.74
1984	32.74	0.25	4.84	0.25	37.58	3.76	33.82
1985	33.82	0.25	4.90	0.25	38.72	3.87	34.85
1986	34.85	0.25	4.96	0.25	39.81	3.98	35.83
1987	35.83	0.25	5.01	0.25	40.84	4.08	36.76
1988	36.76	0.25	5.06	0.25	41.82	4.14	37.63
1989	37.63	0.25	5.11	0.25	42.74	4.27	38.47
1990	38.47	0.25	5.15	0.25	43.62	4.36	39.26
1991	39.26	0.25	5.20	0.25	44.46	4.45	40.01

¤ (initial stock) + (inflow) + (from previous age group) - (outflow)

* 10% of theoretical stock per year (age of stock 55 - 64)

PROJECTION OF VISION CARE MANPOWER STOCK

Optometrists, age group 24 - 34

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t=1[#]	Aging to next Age Group[*]	Stock at t=1
1976	31.00	5.25	0.00	0.75	35.50	3.23	32.27
1977	32.27	5.25	0.00	0.75	36.77	3.34	33.43
1978	33.43	5.25	0.00	0.75	37.93	3.45	34.48
1979	34.48	5.25	0.00	0.75	38.98	3.54	35.44
1980	35.44	5.25	0.00	0.75	39.94	3.63	36.31
1981	36.31	5.25	0.00	0.75	40.81	3.71	37.10
1982	37.10	5.25	0.00	0.75	41.60	3.78	37.82
1983	37.82	5.25	0.00	0.75	42.32	3.85	38.47
1984	38.47	5.25	0.00	0.75	42.97	3.91	39.06
1985	39.06	5.25	0.00	0.75	43.56	3.96	39.60
1986	39.60	5.25	0.00	0.75	44.10	4.01	40.10
1987	40.10	5.25	0.00	0.75	44.60	4.05	40.54
1988	40.54	5.25	0.00	0.75	45.04	4.09	40.95
1989	40.95	5.25	0.00	0.75	45.45	4.13	41.32
1990	41.32	5.25	0.00	0.75	45.82	4.16	41.65
1991	41.65	5.25	0.00	0.75	46.15	4.20	41.96

(initial stock) + (inflow) + (from previous age group) - (outflow)

*9.09% of theoretical stock per year (age of stock 24 - 34)

PROJECTION OF VISION CARE MANPOWER STOCK

Optometrists, age group 35 - 54

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t=1#	Aging to next Age Group*	Stock at t=1
1976	62.00	0.50	3.23	0.50	65.23	3.26	61.96
1977	61.96	0.50	3.34	0.50	65.38	3.27	62.04
1978	62.04	0.50	3.45	0.50	65.49	3.27	62.21
1979	62.21	0.50	3.54	0.50	65.75	3.29	62.46
1980	62.46	0.50	3.63	0.50	66.09	3.30	62.79
1981	62.79	0.50	3.71	0.50	66.50	3.32	63.17
1982	63.17	0.50	3.78	0.50	66.95	3.35	63.61
1983	63.61	0.50	3.85	0.50	67.46	3.37	64.08
1984	64.08	0.50	3.91	0.50	67.99	3.40	64.59
1985	64.59	0.50	3.96	0.50	68.55	3.43	65.13
1986	65.13	0.50	4.01	0.50	69.20	3.46	65.74
1987	65.74	0.50	4.05	0.50	69.79	3.49	66.30
1988	66.30	0.50	4.09	0.50	70.39	3.52	66.87
1989	66.87	0.50	4.13	0.50	71.00	3.55	67.45
1990	67.45	0.50	4.16	0.50	71.61	3.58	68.03
1991	68.03	0.50	4.20	0.50	72.23	3.61	68.62

= (initial stock) + (inflow) + (from previous age group) - (outflow)

* 5% of theoretical stock per year (age of stock 35 -54)

PROJECTION OF VISION CARE MANPOWER STOCK

Optometrists, age group 55 - 64

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t=1#	Aging to next Age Group*	Stock at t=1
1976	52.00	0.25	3.26	0.75	54.76	5.48	49.28
1977	49.28	0.25	3.27	0.75	52.05	5.21	46.85
1978	46.85	0.25	3.27	0.75	49,62	4.96	44.66
1979	44.66	0.25	3.29	0.75	47.45	4.74	42.70
1980	42.70	0.25	3.30	0.75	45.50	4.55	40.95
1981	40.95	0.25	3.32	0.75	43.77	4.38	39.39
1982	39.39	0.25	3.35	0.75	42.24	4.22	38.02
1983	38.02	0.25	3.37	0.75	40.89	4.09	36.80
1984	36.80	0.25	3.40	0.75	39.70	3.97	35.73
1985	35.73	0.25	3.43	0.75	38.66	3.87	34.79
1986	34.79	0.25	3.46	0.75	37.75	3.78	33.98
1987	33.98	0.25	3.49	0.75	36.96	3.70	33.27
1988	33.27	0.25	3.52	0.75	36.29	3.63	32.66
1989	42.66	0.25	3.55	0.75	35.71	3.57	32.14
1990	32.14	0.25	3.58	0.75	35.22	3.52	31.70
1991	31.70	0.25	3.61	0.75	34.81	3.48	31.33

(initial stock) + (inflow) + (from previous age group) - (outflow)

* 10% of theoretical stock per year (age of stock 55 - 64)

PROJECTION OF VISION CARE MANPOWER STOCK *FOR CASE V ONLY*

Ophthalmologist age group 30 - 34

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t=1[#]	Aging to next Age Group[*]	Stock at t=1
1976	15.00	3.25[1]	0.00	0.00	18.25	3.65	14.60
1977	14.60	3.25[1]	0.00	0.00	17.85	3.57	14.28
1978	14.28	2.00	0.00	0.00	16.28	3.26	13.02
1979	13.02	2.00	0.00	0.00	15.02	3.00	12.02
1980	12.02	2.00	0.00	0.00	14.02	2.80	11.22
1981	11.22	2.00	0.00	0.00	13.22	2.64	10.58
1982	10.58	2.00	0.00	0.00	12.58	2.52	10.06
1983	10.06	2.00	0.00	0.00	12.06	2.41	9.65
1984	9.65	2.00	0.00	0.00	11.65	2.33	9.32
1985	9.32	2.00	0.00	0.00	11.32	2.26	9.06
1986	9.06	2.00	0.00	0.00	11.06	2.21	8.84
1987	8.84	2.00	0.00	0.00	10.84	2.17	8.68
1988	8.68	2.00	0.00	0.00	10.68	2.14	8.54
1989	8.54	2.00	0.00	0.00	10.54	2.11	8.43
1990	8.43	2.00	0.00	0.00	10.43	2.09	8.35
1991	8.35	2.00	0.00	0.00	10.35	2.07	8.28

(initial stock) + (inflow) + (from previous age group) - (outflow)

* 20% of theoretical stock per year (age of stock 29 - 34)

1. 1976 and 1977 inflow based on existing data; Assumption that extra-provincial inflow will be curtailed in 1978.

FOR CASE V ONLY

Ophthalmogists age group 35 - 54

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t=1[#]	Aging to next Age Group[*]	Stock at t=1
1976	77.00	3.75[1]	3.65	1.00	83.40	4.17	79.23
1977	79.23	3.75[1]	3.57	1.00	85.55	4.28	81.27
1978	81.27	1.00	3.26	1.00	84.53	4.23	80.30
1979	80.30	1.00	3.00	1.00	83.30	4.17	79.14
1980	79.14	1.00	2.80	1.00	81.94	4.10	77.84
1981	77.84	1.00	2.64	1.00	80.48	4.02	76.46
1982	76.46	1.00	2.52	1.00	78.98	3.95	75.03
1983	75.03	1.00	2.41	1.00	77.44	3.87	73.57
1984	73.57	1.00	2.33	1.00	75.90	3.79	72.10
1985	72.10	1.00	2.26	1.00	74.36	3.72	70.64
1986	70.64	1.00	2.21	1.00	72.85	3.64	69.21
1987	69.21	1.00	2.17	1.00	71.38	3.57	67.81
1988	67.81	1.00	2.14	1.00	69.95	3.50	66.45
1989	66.45	1.00	2.11	1.00	68.56	3.43	65.14
1990	65.14	1.00	2.09	1.00	67.23	3.36	63.86
1991	63.86	1.00	2.07	1.00	65.93	3.30	62.63

[#] (initial stock) + (inflow) + (from previous age group) - (outflow)

[*] 5% of theoretical stock per year (age of stock 35 - 54)

[1] 1976 and 1977 inflow based upon existing data; Assumption is that extra-provincial inflow will be curtailed in 1978.

PROJECTION OF VISION CARE MANPOWER STOCK

FOR CASE V ONLY

Ophthalmologists age group 55 - 64

Year t	Initial Stock t	Inflow	From Previous Age Group	Outflow	Theoretical Stock at t=1[#]	Aging to next Age Group*	Stock at t=1
1976	22.00	0.25[1]	4.17	0.25	26.17	2.62	23.55
1977	23.55	0.25[1]	4.28	0.25	27.83	2.78	25.05
1978	25.05	0.00	4.23	0.25	29.03	2.90	26.13
1979	26.13	0.00	4.17	0.25	30.05	3.00	27.04
1980	27.04	0.00	4.10	0.25	30.89	3.09	27.80
1981	27.80	0.00	4.02	0.25	31.57	3.16	28.42
1982	28.42	0.00	3.95	0.25	32.12	3.21	28.90
1983	28.90	0.00	3.87	0.25	32.52	3.25	29.27
1984	29.27	0.00	3.79	0.25	32.81	3.28	29.53
1985	29.53	0.00	3.72	0.25	33.00	3.30	29.70
1986	29.70	0.00	3.64	0.25	33.09	3.31	29.78
1987	29.78	0.00	3.57	0.25	33.10	3.31	29.79
1988	29.79	0.00	3.50	0.25	33.04	3.30	29.74
1989	29.74	0.00	3.43	0.25	32.92	3.29	29.62
1990	29.62	0.00	3.36	0.25	32.73	3.27	29.46
1991	29.46	0.00	3.30	0.25	32.51	3.25	29.26

(initial stock) + (inflow) + (from previous age group) - (outflow)

*10% of theoretical stock per year (age of stock 55 - 64)

1. 1976 and 1977 inflow based upon ixisting data; Assumption is that extra-provincial inflow will be curtailed in 1978.

APPENDIX VI

Number of MSC Active Vision Care Personnel[1] and FTE[2] Vision Care Personnel
adjusted for satellite practices
by Regional Hospital District in British Columbia

for the year May 1975 to April 1976.

Regional Hospital District	Adjusted[4] Number	Number per Population[3]	Number of FTE[2]	FTE[2] per Population[3]	Ratio FTE /Number
1 East Kootenay	6.00	131.08	5.86	128.02	0.98
2 Central Kootenay	5.77	120.41	4.51	94.12	0.78
2a Kootenay Boundary	4.23	135.16	4.67	149.22	1.10
3 Okanagan-Similkameen	6.10	120.38	5.56	109.72	0.91
4 Columbia-Shuswap	3.00	86.20	1.46	41.95	0.49
5 North Okanagan	6.24	136.26	5.76	125.78	0.92
6 Central Okanagan	8.76	126.73	6.70	96.93	0.76
7 Thompson-Nicola	13.00	143.97	13.39	148.29	1.03
8 Cariboo	3.21	63.35	3.05	60.20	0.95
9 Squamish-Lillooet	0.34	21.98	0.34	21.98	1.00
10 Fraser-Cheam	5.00	99.31	3.53	70.11	0.71
11 Central Fraser Valley	6.00	70.02	5.42	63.25	0.90
12 Dewdney-Alouette	3.62	71.17	2.90	57.01	0.80
13 Greater Vancouver	145.59	137.75	130.51	123.48	0.90
14 Sunshine Coast	1.30	106.14	1.52	124.10	1.17
15 Powell River	2.00	102.98	1.69	87.02	0.84
16 Mount Waddington	0.27	21.94	0.27	21.94	1.00
16a Central Coast	0.04	9.68	0.05	12.10	1.25
17 Skeena-Queen Charlotte	2.32	105.85	1.69	77.11	0.73
18 Kitimat-Stikine	1.68	44.10	2.64	69.29	1.57
19 Bulkley-Nechako	0.99	31.47	0.99	31.47	1.00
20 Fraser-Fort George	6.80	87.56	9.48	122.06	1.39
21 Peace River-Liard	5.00	114.05	3.64	83.03	0.73
22 Stikine	0.0	0.0	0.0	0.0	0.0
23 Capital	31.74	141.34	29.30	130.47	0.92
24 Cowichan Valley	3.00	66.46	1.95	43.20	0.65
25 Nanaimo	8.00	131.65	8.77	144.32	1.10
26 Alberni-Clayoquot	3.00	94.53	2.02	63.65	0.67
27 Comox-Strathcona	4.00	71.73	4.15	74.42	1.04
TOTAL	287.00	119.27	261.74	108.78	0.91

[1] Ophthalmologists and Optometrists billing to MSC.

[2] Full Time Equivalents.

[3] Population Estimates obtained from, Population: Preliminary Counts, Statistics Canada. (1976 Census)
Number is per 1,000,000 population.

[4] Adjusted to account for time optometrist spends in region (proportion of week etc.)

Prepared by:

Health Manpower Research Unit
University of B.C.

APPENDIX VII

1976 Census of Canada

Population:
Preliminary Counts

Regional Hospital District	Population
1. East Kootenay	45,774
2. Central Kootenay	47,920
2a. Kootenay Boundary	31,297
3. Okanagan-Similkameen	50,673
4. Columbia-Shuswap	34,801
5. North Okanagan	45,794
6. Central Okanagan	69,121
7. Thompson-Nicola	90,294
8. Cariboo	50,667
9. Squamish-Lillooet	15,466
10. Fraser-Cheam	50,349
11. Central Fraser Valley	85,692
12. Dewdney-Alouette	50,867
13. Greater Vancouver	1,056,894
14. Sunshine Coast	12,248
15. Powell River	19,421
16. Mount Waddington	12,306
16a. Central Coast	4,133
17. Skeena-Queen Charlotte	21,917
18. Kitimat-Stikine	38,098
19. Bulkley-Nechako	31,459
20. Fraser-Fort George	77,664
21. Peace River-Liard	43,841
22. Stikine	1,546
23. Capital	224,566
24. Cowichan Valley	45,138
25. Nanaimo	60,768
26. Alberni-Claquot	31,737
27. Comox-Strathcona	55,761
TOTAL	2,406,212

Prepared by:

Health Manpower Research Unit
University of B.C.

*** B.C. RESEARCH *** BRITISH COLUMBIA POPULATION PROJECTIONS *** 9/74 ***   BRITISH COLUMBIA - TOTAL

	** HISTORICAL YEARS **			******************************** FORECAST YEARS ********************************										
	1961	1966	1971	1974	1975	1976	1977	1978	1979	1980	1981	1986	1991	1996
BIRTHS	36480	32367	34770	36558	37318	38189	39423	40746	42118	43497	44845	49687	51789	54594
AGE														
0- 4	186793	188777	175401	189696	196329	203382	209641	215929	222163	228259	234137	257337	267305	281366
5- 9	171661	202737	212225	197441	193153	190313	194071	199508	206180	213645	221459	250248	273488	283719
10-14	150662	182421	222335	226767	225786	223796	219146	214198	209531	205722	203352	233305	262156	286200
15-19	112656	158466	201105	221917	227430	232056	235436	237782	239054	239210	238208	214397	244866	274723
20-24	95228	129741	185002	209926	217361	224498	232609	240291	247331	253515	258629	260667	233224	265979
25-29	101057	114817	156807	194174	206814	219034	229090	238469	247226	255411	263077	295439	294776	262758
30-34	113216	112860	136119	159122	168483	178743	191565	204939	218487	231833	244600	286531	319982	318928
35-39	113754	122112	130890	139654	144087	149533	157061	165684	175329	185922	197391	265298	308894	344385
40-44	110055	120279	124787	128879	130929	133448	136462	140110	144480	149660	155739	202716	270606	314706
45-49	98693	112360	125774	125327	125069	125119	126682	128743	131272	134239	137616	159626	207078	276002
50-54	86137	100689	117622	123957	125485	126735	127241	127606	127959	128430	129145	140885	162914	211005
55-59	67397	81709	103713	109714	111347	113027	115978	118983	121911	124629	127007	129164	140769	162737
60-64	56441	67611	87482	98203	101474	104564	107192	109673	112054	114386	116718	130091	131814	143482
65-69	50757	55457	68135	77420	80840	84435	88670	92981	97259	101398	105290	117295	130618	132283
70-	114851	123773	136835	149422	154933	161241	169381	178260	187741	197680	207931	258828	288319	321143
TOTAL	1629078	1873809	2184232	2351611	2409514	2469929	2540220	2613150	2687970	2763933	2840294	3201826	3536808	3879413
% MALE	50.8	50.6	50.4											

APPENDIX VIII

BACKGROUND TO THE ESTABLISHMENT OF THE VISION CARE TASK FORCE

The suggestion for a Vision Care Task Force originated in a report prepared for the Provincial Health Manpower Working Group in 1974 (Shillington and Anderson, 1974), which recommended to the deputy ministers in Health, Education and Labour that a policy was needed concerning the future of vision care. The need for a policy was heightened by the interest of the Western Canada Post-secondary Education Coordinating Committee in a Western School of Optometry, situation reports on optometry and eye care prepared within the Western Provinces, pressures for a School of Optometry at the University of Victoria, and a high proportion of ophthalmologists to population in B.C..

The Shillington-Anderson report, after examining the need for and the supply of workers in this field, suggested that policy should flow from a coordinated vision care system. Such a system stresses that health workers are to be trained to possess those competencies which they will regularly use at a level of health or medical care at which they will be employed in required numbers to meet the need for care at that particular level.

Thus a coordinated vision care system would distinguish vision care from eye care, and would seperate out health surveillance, health maintenance and health restoration. But optometric and ophthalmic services already exist as overlapping systems with both groups performing primary vision care services.

As Shillington and Anderson noted in 1974,

> Although there is no current consensus between the two groups of health workers about the breadth of services (or even the validity) of those services offered by optometrists, there is an acceptance that optometrists are more concerned with variants of health and physical and non-organic dysfunction than are ophthalmologists. Whether optometrists should emphasize the psychological, prevention and educational aspects of vision care is questioned by ophthalmologists on the grounds of effectiveness. These issues aside, however, (and issues which ultimately affect productivity), both workers or suitable replacements, are clearly required in a rationalized system.

These authors further recommended that until a policy on the characteristics of the whole system was established, a Western School of Optometry should be delayed. But they noted that the emerging system must not work a hardship either upon the public, or upon the practicing professionals who were used to working under the present system.

The Health Manpower Working Group recommended to the Minister of Health that he create a Vision Care Task Force to help elaborate plans that would lead to the development, however slowly, of a coordinated system. The Ministers of Health and Education agreed to take no action to perpetuate the existing situation, to develop a School of Optometry, to purchase positions for British Columbian residents at Schools of Optometry elsewhere, or to change acts or regulations until the Task Force had reported. The Task Force thus would by negotiation and review, examine whether the policy of a coordinated vision and eye care system was capable of implementation.

Accordingly on April 1st, 1976, the Minister of Health established a Vision Care Task Force in British Columbia.